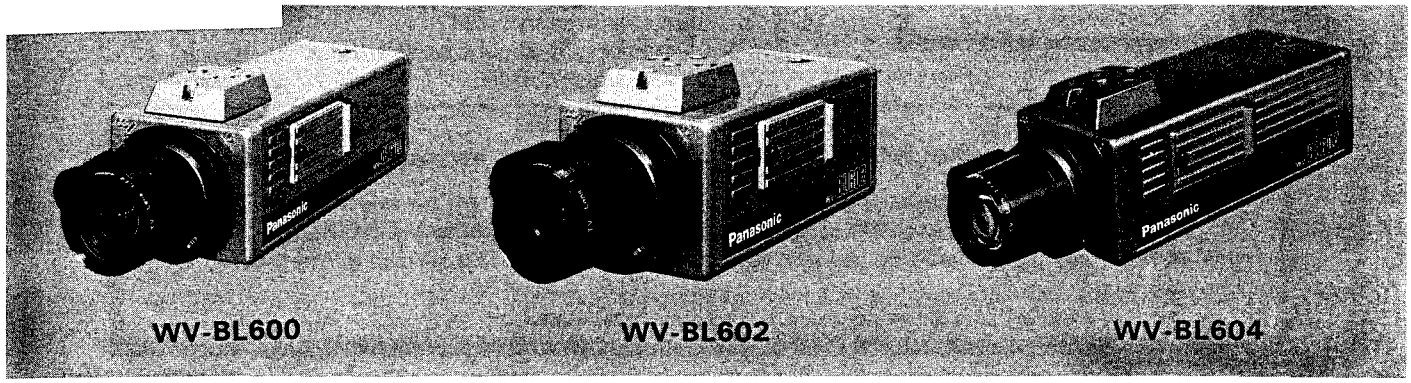
ORDER NO. AVS8909238C8

Service Manual

CCTV Camera

WV-BL600/WV-BL602/WV-BL604



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Panasonic

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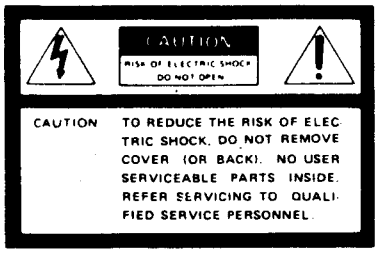

CAUTION
RISK OF ELECTRIC SHOCK
DO NOT OPEN
CAUTION TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER (OR BACK). NO USER SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL

This symbol warns the user that uninsulated voltage within the unit may have suificient magnitude to cause electric shock. Therefore, it is dangerous to make any kind of contact with any inside part of this unit.

This symbol alerts the user that important literature concerning the operation and maintenance of this unit has been included.
Therefore, it should be read carefully in order to avoid any problems.

IMPORTANT SAFETY NOTICE

There are special components used in this equipment which are important for safety. These parts are indicated by the " ⚠ " mark on the schematic diagram and the replacement parts list. It is essential that these critical parts should be replaced with manufacturer's specified parts to prevent shock, fire, or other hazards.
Do not modify the original design without permission of manufacturer.

SPECIFICATIONS

Pick-up Device:	681 (H) × 582 (V) pixels, Interline Transfer CCD
Scanning Area:	6.4(H) × 4.8 (V) mm^2 (1/2-inch Image size)
Scanning:	625 Lines/50 Fields/25 Frames
Horizontal:	15.625 KHz
Vertical:	50 Hz
Synchronization:	Internal or external switchable automatically at INT position
	Line-locked sync at LL position
	External Input: 1.0Vp-p/75 ohms composite video signal (GENLOCK)
Resolution (Normal):	500 lines (Horizontal) 400 lines (Vertical)
Signal to Noise Ratio:	48dB (Typical at Normal mode and AGC OFF)
Minimum Illumination:	0.05 footcandles (0.5 Lux) at F1.4, AGC ON and SENS UP OFF
AGC:	Selectable ON (12dB) or OFF
Lens Mount:	C-mount or Special C-mount (CS-mount)
Strobe Effect Shutter:	Selectable Shutter Speed for 1/250 sec, 1/500 sec, or 1/1,000 sec.
Electronic Zoom:	Selectable ON (X2) or OFF
	Center only for stand alone operation and Selectable
	Center and four corners (5 areas) with the specified Camera Control Unit
Electronic Sensitivity Up:	Selectable ON or OFF
	Automatic Sensitivity Selection of up to X 10 for stand alone operation
	Possible Automatic or Manual Sensitivity Selection with the specified Camera Control Unit.
	Automatic Sensitivity Up: X2, X4, X6, X10 (for Maximum Level)
	Manual Sensitivity Up: X1, X2, X4, X6, X10, X16, X32.

Connectors:	VIDEO OUT: 1Vp-p/75 ohms, composite signal GENLOCK IN: 1Vp-p/75 ohms, composite video, 0.3Vp-p/75 ohms black burst or 4Vp-p/75 ohms, composite sync.
Switches:	AGC ON/OFF Switch, AUTO IRIS, DC/VIDEO Switch, SYNC, INT/LL Switch (WV-BL600 and WV-BL604), GENLOCK 75 ohms ON/ OFF Switch, CAMERA MODE, SHTR/NOR/SENS UP Switch, Shutter Speed Selection Switch, Electronic Zoom ON/OFF Switch, REMOTE/LOCAL Selection Switch.
Controls:	H PHASE Control (-0.1μS - +2.5μS) V PHASE Control (-115° - +215°) ALC LEVEL Control
Ambient Temperature:	−30°C - +50°C (−22°F - 122°F)
Power Source:	WV-BL600/A: 240V AC, 50 Hz WV-BL600/B: 240V AC, 50 Hz WV-BL600/G: 220V AC, 50 Hz WV-BL602: 12V DC WV-BL604: 24V AC, 50Hz
Power Consumption:	WV-BL600: 6W WV-BL602: 0.36A WV-BL604: 6W
Dimensions (without lens):	WV-BL600: 70(W) × 70.5(H) × 174(D) mm WV-BL602: 70(W) × 70.5(H) × 141(D) mm WV-BL604: 70(W) × 70.5(H) × 174(D) mm
Weights:	WV-BL600: 1060g WV-BL602: 730g WV-BL604: 930g

Weights and dimensions indicated are approximate.
Specifications are subject to change without notice.

Standard Accessories

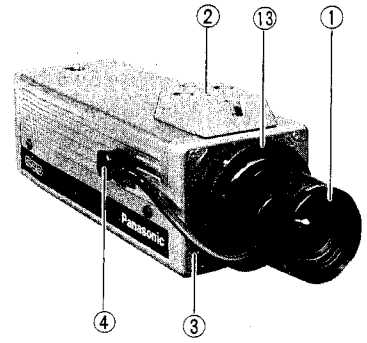
- o ALC Lens Connector (YFE4191J100) 1pc
- o Body Cap 1pc

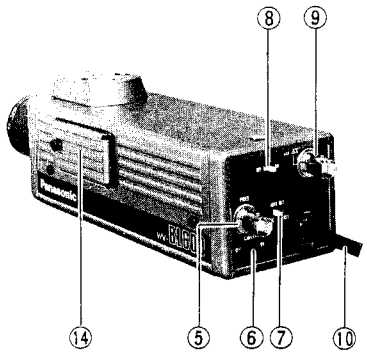
Optional Accessories

- o Camera Control Unit: WV-CU204
- o Lens:
  - WV-LA2.8
  - WV-LA4.5
  - WV-LA6B2
  - WV-LA12B2
  - WV-LA18
  - WV-LA36
  - WV-LM4.5
  - WV-LM6B2
  - WV-LM12B2
  - WV-LZ81/6

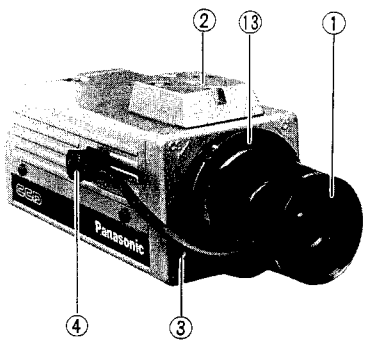
MAJOR OPERATING CONTROLS AND THEIR FUNCTIONS

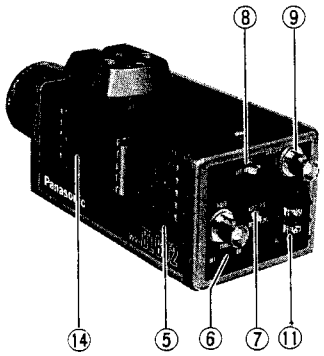
WV-BL600



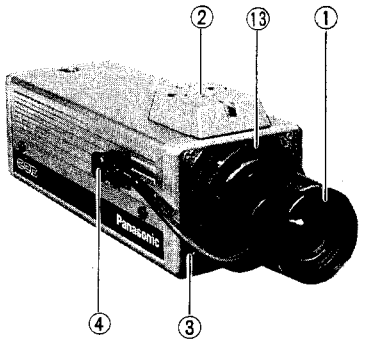


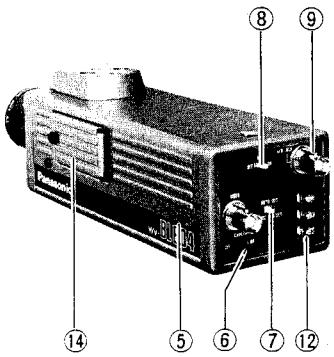
WV-BL602





WV-BL604

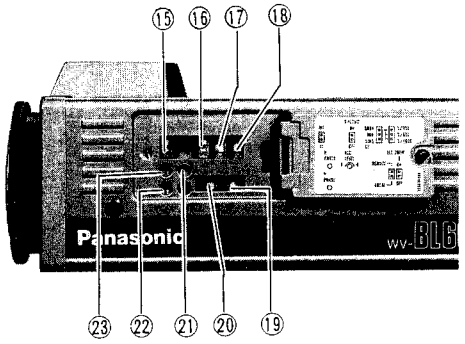




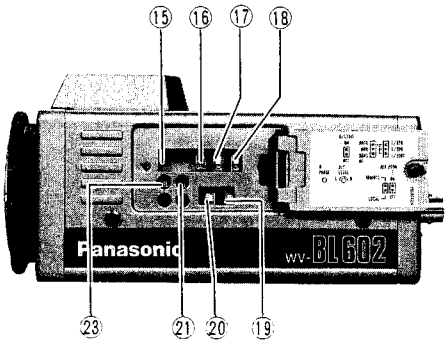
14 Operation Panel Cover

Inside of Operation Panel

(For WV-BL600 and WV-BL604)



(For WV-BL602)



1 **Automatic Iris Lens (Option)**

2 **Camera Mounting Screw Hole**

This threaded hole (1/4" - 20) is used to mount the camera onto a mounting bracket or tripod.

3 **Power Indicator**

4 **Auto Iris Lens Connector**

Supplies the power and either the video signal or DC control signal selected by the Lens Selection Switch (7) to the Auto Iris Lens.

The 4-pin connector for the lens which originally has different type of connector is a standard accessory (Part No. YFE4191J100).

5 **Video Output Connector (VIDEO)**

A composite video signal is provided at this connector.

6 **Camera ON/OFF Switch**

7 **Lens Selection Switch (AUTO IRIS, DC/VIDEO)**

This switch is used to select the auto iris control signal supplied to the lens from the Auto Iris Lens Connector (4).

DC:

Choose this position when the auto iris control lens requiring DC control signal such as WV-LA4.5, WV-LA6, WV-LA12, WV-LA18, WV-LA36, WV-LA6B2, WV-LA12B2 etc., is mounted on the camera.

VIDEO:

Choose this position when the auto iris control lens requiring video signal such as WV-LA8B, WV-LA16B, WV-LA25B, WV-LA50B etc., is mounted on the camera.

8 **AGC ON/OFF Switch (AGC, ON/OFF)**

This switch is used to select the gain of the video amplifier as follows ;

ON:

When the lens iris is fully open at low light shooting, a clear picture is obtained by automatic increase of the gain.

OFF:

A natural and low-noise picture is obtained at low light shooting.

Note:

When the sensitivity up mode is selected by the Camera Mode Selection Switch (17) or the Camera Control Unit, the AGC is automatically set to ON mode regardless of this switch position.

9 **Gen-Lock Video Input Connector (GENLOCK)**

A composite B/W or colour, 1.0Vp-p/75 ohms video signal, or black burst 0.3Vp-p/75 ohms or composite sync, 4Vp-p/75 ohms should be supplied to this connector for external synchronization.

10 **Power Cord (For WV-BL600)**

11 **DC 12V IN Terminal Strip (DC 12V) (For WV-BL602)**

This terminal accepts DC 12V power source (10.8 - 16V).

Caution:

To Prevent fire or shock hazard, the UL listed wire VW-1, style 1007 should be used for the cable for DC 12V Input Terminal.

12 **AC 24V In Terminal Strip (AC 24V) (For WV-BL604)**

Accepts AC 24V power source (19.5V - 28V).

Be sure to connect grounding lead to the GND terminal.

Caution:

To Prevent fire or shock hazard, the UL listed wire VW-1, style 1007 should be used for the cable for AC 24V Input Terminal.

13 **Flange-back Adjusting Ring**

Used to adjust the back focus or picture focus by rotating this ring to clockwise for C-mount lens or counterclockwise for special C-mount (CS mount) lens.

CAUTION:

1. Always set this ring to fully clockwise before mounting the lens.
2. Do not turn this ring too much to counterclockwise when the C-mount lens is mounted as this could damage the inner glass or CCD image sensor.

14 Operation Panel Cover

15 Sync Selection Switch (INT/LL)

(For WV-BL600 and WV-BL604)

This switch is used to select the camera synchronization mode.

INT:

When no signal is supplied to the GENLOCK connector, the camera synchronization mode is set to internal 2 : 1 interlace.

Whenever the GENLOCK video signal is supplied to the GENLOCK connector, the camera synchronization mode is automatically set to external synchronization.

LL:

The camera synchronization mode is set to Line-Lock even if the GENLOCK video signal is supplied to the GENLOCK connector.

Note: Set this switch to INT position for gen-lock operation.

16 Gen lock Termination Switch

(G/L 75 ohms, ON/OFF)

When looping through the gen-lock video input signal, set this switch to OFF position and all other cases, set this to ON position.

17 Camera Mode Selection Switch

(SHTR/NOR/SENS UP)

This switch is used to select the camera mode among the SHTR (Strobe Effect Shutter), NOR (Normal) and SENS UP (Electronic Sensitivity Up).

SHTR:

The strobe effect shutter mode is enabled and the shutter speed can be chosen among 1/250 sec., 1/500 sec. and 1/1,000 sec. by the Shutter Speed Selection Switch (18).

NOR:

A normal mode is selected.

SENS UP:

The electronic sensitivity up mode is performed in the low lighting condition by changing the shutter speed automatically to 1/25 sec. (X2), 1/12.5 sec. (X4), 1/8.3 sec. (X6) and 1/5 sec. (X10) together with the AGC function when the Camera Control Unit, such as WV-CU204 etc., is not connected.

CAUTION:

Refer to the operating instruction of the Camera Control Unit for the system operation together with Camera Control Unit.

Notes:

1. Moving objects when shot at the electronic sensitivity up mode will appear blurred since the SENS UP mode is equivalent to set the shutter speed to slower in the still picture camera.
2. The horizontal and vertical resolution will be lowered in the electronic sensitivity up and electronic zoom modes.
3. Under high temperature (50°C (122°F)) condition and electronic sensitivity up mode, white spots may sometimes appear on the picture, This is normal and not a sign of failure.
4. The gen-lock input signal should be specified as CCIR standard or the like in order to maintain the proper electronic sensitivity up operation.

18 Shutter Speed Selection Switch

(1/250, 1/500, 1/1000)

This switch selects the speed of the electronic shutter, which can be 1/250 sec, 1/500 sec or 1/1,000 sec.

19 Electronic Zoom ON/OFF Switch

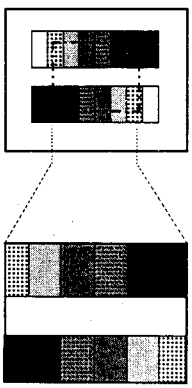
(ELE ZOOM, ON/OFF)

This switch is set to on and off the electronic zoom (X2) on the center of the picture as shown in the figure.

Electronic Zoom

OFF:

ON:



Notes:

1. The horizontal and vertical resolution will be lowered in the electronic zoom and electronic sensitivity up modes.
2. The vertical edge of the fast-moving objects will appear zigzagged in the electronic zoom mode because of the read/write time for the picture memories inside.
3. The gen-lock input signal should be specified as CCIR standard or the like in order to maintain the proper electronic zoom operation.

20 Control Mode Selection Switch

• (REMOTE / LOCAL)

This switch is used to select the control mode as follows.

LOCAL:

When the camera is used without the Camera Control Unit, such as WV-CU204 etc., set this switch to the LOCAL position before turning on the camera.

REMOTE:

When the camera is used with the Camera Control Unit, such as WV-CU204 etc., set this switch to the REMOTE position before turning on the camera.

CAUTION:

Refer to the operating instruction of the Camera Control Unit for more details of the REMOTE control function.

Notes:

Even if the Control Mode Selection Switch is set to REMOTE position, control switches on the camera, such as Camera Mode Selection Switch (17) , Shutter Speed Selection Switch (18) and Electronic Zoom ON/OFF Switch (19) etc., are enabled.

21 Auto Iris Level Control (ALC LEVEL, L (low)/H (High))

This control adjusts the control level of the auto iris control when the lens selection switch (7) is set to the DC position and the auto iris lens which requires the DC control voltage such as WV-LA12B2 etc., is mounted on the camera.

Note: Adjust this control while setting the AGC ON/OFF Switch (8) to OFF position.

22 Vertical Phase Control (V PHASE)

(For WV-BL600 AND WV-BL604)

The vertical phase of the camera signal can be adjusted to match the vertical phase of the power line at the power Cord (10) or AC 24V In Terminal Strip (12).

23 Horizontal Phase Control (H PHASE)

The horizontal phase of the camera signal can be adjusted to match the horizontal phase of the signal at the Gen-lock Video Input Connector (9).

CONNECTION

Power Cable

Keep the camera power switched off during installation.

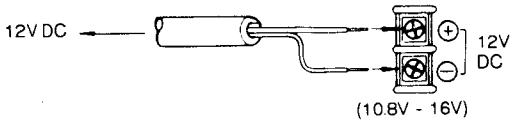
A: WV-BL600

1 Connect the AC Power Cord (10) to a 50Hz electrical outlet 240V AC for WV-BL600/A and WV-BL600/B and 220V AC for WV-BL600/G.

B: WV-BL602

1 A power supply of 12V DC is required.

2 Connect the power cable to the 12C DC Power Terminal Strip (11) on the rear panel of the camera. Be careful not to obstruct the operation of camera ON/OFF switch.



Resistance of copper wire [at 68°F (20°C)

Copper wire size (AWG)	#24 (0.22mm²)	#22 (0.33mm²)	#20 (0.52mm²)	#18 (0.83mm²)
Resistance ohms/m	0.078	0.050	0.030	0.018

- Calculation method of maximum cable length between camera and power supply.

  16V DC> R x 0.36 x L> 10.8V DC

  L: Cable length (Meter)

  R: Resistance of copper wire (Ω/m)

  VA: DC voltage of power supply

$$L\,standard = \frac{V_A - 12}{0.36 \times R}\ (Meter)$$

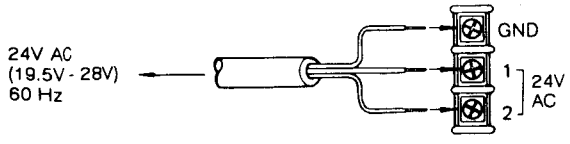
$$L\,minimum = \frac{V_A - 16}{0.36 \times R}\ (Meter)$$

$$L\,maximum = \frac{V_A - 10.8}{0.36 \times R}\ (Meter)$$

Caution:
To Prevent fire or shock hazard, the UL listed wire VW-1, style 1007 should be used for the cable for DC 12V Input Terminal.

C: WV-BL604

1. A power supply of 24V 50Hz is required.
2. Connect the power cable to the 24V in Terminal Strip (12) on the rear panel of the camera.



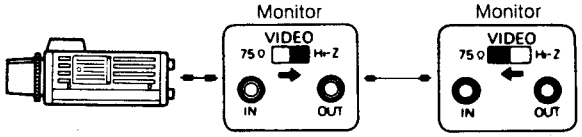
Recommended wire guage size for 24V AC line.

Copper wire size (AWG)	#24 (0.22mm²)	#22 (0.33mm²)	#20 (0.52mm²)	#18 (0.83mm²)
Length of Cable (Approx.) [ft]	340	550	850	1400*

Caution:
To Prevent fire or shock hazard, the UL listed wire VW-1, style 1007 should be used for the cable for AC 24V Input Terminal.

Video Cable

1. Use a video monitor whose resolution is at least equal to the camera's.
2. Terminate the camera output with 75-ohm resistor at the furthest end of its cable run.
   A. Use 75-ohms coaxial cable. (RG-59/U, RG-6/U, RG-11/U, RG- 15/U)
   B. Always set the last monitor's termination switch to 75 ohms, and set the termination switches of intermediate monitors to HIGH (HI-Z).



C. The maximum extensible coaxial cable length between the camera and the monitor is shown in the table 1. Since cable quality varies among manufacturers, please verify video quality before final installation, if maximum lengths are to be used.

Table 1

Type of coaxial cable		RG-59/U (3C-2V)	RG-6U (5C-2V)	RG-11/U (7C-2V)	RG-15/U (10C-2V)
Recommended Maximum cable length	(ft)	825	1,650	1,980	2,640
	(m)	250	500	600	800

3. Wiring precautions:

- o Do not bend coaxial cable into a curve whose radius is smaller than 10 times the cables diameter.
- o Never staple the cable - not even with circular staples. Mismatching will occur.
- o Never crush or pinch the cable.

All these will change the impedance of the cable and cause poor picture quality.

LENSES

1. Selection of Lens

It is recommended to use the following Auto Iris Control Lens.

Specifications \ Models		WV-LA2.8 (Wide Angle)	WV-LA4.5 (Wide Angle)	WV-LA6B2 (Wide Angle)	WV-LA12B2 (Standard)	WV-LA18 (Telephoto)	WV-LA36 (Telephoto)	WV-LZ81/6 (Motorized Zoom)
Image Size		1/2" (6.4 (H) x 4.8 (V) mm)						
Focal Length		2.8 mm	4.5 mm	6 mm	12 mm	18 mm	36 mm	8.5 - 51 mm (6X)
Maximum Aperture Ratio		1 : 1.4	1 : 1.4	1 : 1.4	1 : 1.4	1 : 1.4	1 : 1.8	1 : 1.2 (Wide) 1 : 1.3 (Tele)
Angular Field of View	H	107°17'	70°6'	56°47'	30°26'	20°36'	10°13'	41°56' (Wide) 7°14' (Tele)
	V	88°4'	55°41'	43°31'	22°49'	15°22'	7°39'	31°19' (Wide) 5°28' (Tele)
Focusing Range		Adjusted by Camera	0.92 (ft) - ∞ 0.3 (m) - ∞	Adjusted by Camera		0.89 (ft) - ∞ 0.27 (m) - ∞	3.3 (ft) - ∞ 1 (m) - ∞	3.3 (ft) - ∞ 1 (m) - ∞
Mount		Special C-mount (CS mount, 1" - 32UN)						
Optional Filter Size		None	φ 37.5 mm P = 0.5	None	None	φ 37.5 mm P = 0.5	φ 37.5 mm P = 0.5	φ 49 mm P = 0.75
Dimensions		φ 1-11/16" x 1-5/16" (φ 43x34mm)	φ 1-11/16" x 1-5/8" (φ43x41mm)	φ 1-11/16" x 1-3/8" (φ43x36mm)	φ 1-11/16" x 1-3/8" (φ43x36mm)	φ 1-11/16" x 1-5/8" (φ43x41mm)	φ 1-11/16" x 1-5/8" (φ43x41mm)	3-3/8"(W)x2-7/16"(H) 3-7/8" (D) 86(W)x62(H)x
Weight		0.14 (65 g)	0.18 (80 g)	0.11 (50 g)	0.088 (40 g)	0.15 (70 g)	0.18 (80 g)	0.92 (420 g)

* Dimensions and weight indicated are approximate.
* Specifications are subject to change without notice.

When a manual iris control lens is to be used with, the following lenses are recommended.
In this case, the lighting condition should not be varied.

Specifications \ Models		WV-LM4.5 (Wide Angle)	WV-LM6B2 (Wide Angle)	WV-LM12B2 (Standard)
Image Size		1/2" (6.4 (H) x 4.8 (V) mm)		
Focal Length		4.5 mm	6 mm	12 mm
Maximum Aperture Ratio		1 : 1.4	1 : 1.4	1 : 1.4
Angular Field of View	H	70°6'	56°47'	30°26'
	V	55°41'	43°31'	22°49'
Focusing Range		Adjusted by Camera		
Mount		Special C-mount (CS mount, 1" - 32UN)		
Optional Filter Size		φ 37.5 mm, P = 0.5	None	None
Dimensions		φ 1-11/16" x 1-9/16" (φ 43 x 41 mm)	φ 1-11/16" x 1-1/2" (φ 43 x 39 mm)	φ 1-11/16" x 1-1/2" (φ 43 x 39 mm)
Weight		0.165 (75 g)	0.1 (45 g)	0.077 (35 g)

* Dimensions and weight indicated are approximate.
* Specifications are subject to change without notice.

CIRCUIT DESCRIPTION

1. Principle of Black and White CCD Camera

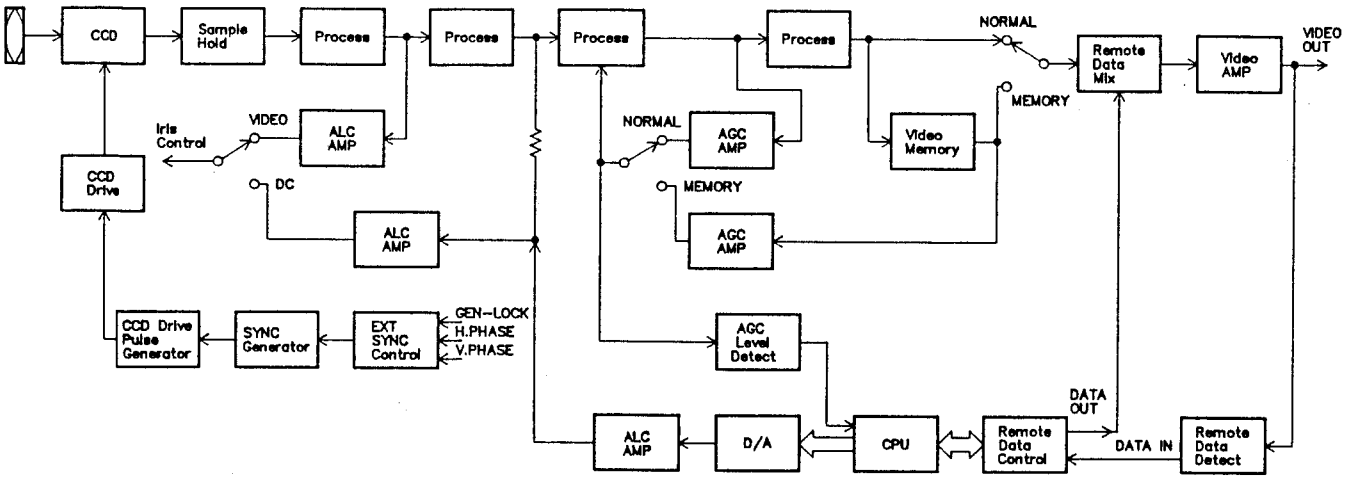


Fig. 1-1 Block Diagram of WV-BL600 Series

The incoming light which passes through the lens reaches the surface of the CCD (Charge Coupled Device) image sensor. The CCD image sensor produces the output signal whose signal level corresponds to incoming light intensity. The output signal is converted into video signal by sample hold circuit. This signal is sent to signal processing circuit where their gamma characteristics is corrected, signal level is set and sync signal is mixed for forming composite video signal.

The sync generator generates necessary pulses for producing the composite video signal and sends them to the CCD drive pulse generator circuit and signal processing circuit.

The CCD drive pulse generator generates H. and V. transfer pulses which are synchronized with the H. and V. drive pulses and sends them to the CCD image sensor through CCD drive circuit for driving sensor.

The gen-lock control circuit receives external sync signal and generates clock pulse which supplied to sync generator circuit for synchronizing the horizontal (H.) and vertical (V.) sync signal.

The remote data control circuit receive the data from the CCU (Camera Control Unit), such as WV-CU204 etc., and return the data to the CCU.

These data is used for WV-BL 600 series remote control by the CCU.

2. Sensor Board

This board receives the pulses from Drive board and sends these pulses to CCD image sensor IC1 in order to take out the CCD output signal.

The CCD output signal obtained at pin 3 of IC1 is fed through buffer Q1 to the Process board to convert it into the video signal.

- **CCD Image Sensor**

The CCD image sensor used in camera is interline transfer CCD sensor.

The CCD image sensor has 396,342 picture elements (horizontal 681 × vertical 582).

Its image size is 6.42mm (H) × 4.83mm (V) so that 1/2-inch optics and lens can be used.

The CCD image sensor is mounted on dual in line package with 20 pins and has a optical window in front of the cell as shown in Fig 2-1.

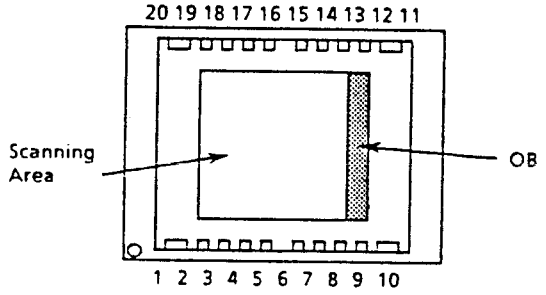


Fig. 2-1 Appearance of CCD Image Sensor

Items	Value	Unit
Chip Size	6.82 (V) × 7.85 (H)	mm^2
Cell Size	8.40 (V) × 9.60(H)	μm^2
Image Size	4.83 (V) × 6.42(H)	mm^2
Number of Elements	582 (V) × 681(H) (Excluding O. B)	PCS

Table 1 Specification of CCD Image Sensor MN 3751SK

The pin identification of CCD image sensor MN3751SK is as follows.

Pin No	Name	Description
1	øR	Reset Pulse
2	RD	Reset Drain
3	GND	Ground
4	LG	Gate of Output Load Transistor
5	VO	Video Output
6	OD	Output Drain
7	øH1	H Transfer Pulse 1
8	øH2	H Transfer Pulse 2
9	OG	Output Gate
10	HS	H CCD Input Source
11	PT	Protection for P-Well
12	TG	Test Terminal
13	—	Not Used
14	øV1	V Transfer Pulse 1
15	øV4	V Transfer Pulse 4
16	øV2	V Transfer Pulse 2
17	øV3	V Transfer Pulse 3
18	—	Not Used
19	PW	P-Well
20	Sub	Substrate

• Constitution and Outline of Transfer of CCD Image Sensor

CCD image sensor is made up of a simple MOS structure and consists of ;

(1) Photo diode(PD) .. Generates charge packets corresponding to the incoming light intensity.

(2) V-CCD ..... Accumulates the charge packets from PD and transfers them in the vertical direction.

(3) H-CCD ..... Transfers charge packets in the horizontal direction on the output.

(4) Output Section ... Outputs the signal transferred from the H-CCD sequentially.

The block diagram of CCD image sensor is show below. Each pixel corresponds to one photo diode.

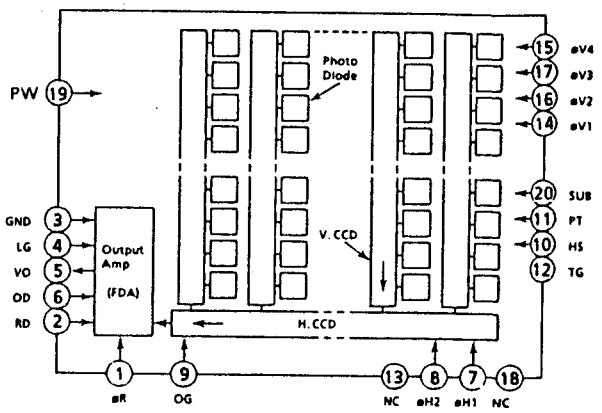


Fig.2-2 Block Diagram of CCD Image Sensor

• Interline Transfer System

When the incoming light reaches the photo diode, the signal-charges are accumulated according to the intensity of light. Accumulated charge packets on the independent sensor (photo diode) are transferred to the vertical shift register (V-CCD) all at once in every vertical blanking period. They are then shifted one-step down to the horizontal shift registor (H-CCD) in every horizontal blanking period. The charge packets in H-CCD are transferred to the output amplifier by turns, and taken out as the output signal.

3. Drive Board

3-1 Sample Hold Circuit

This circuit receives the modulated CCD output signal from the CCD image sensor IC1 on the Sensor board and eliminates reset pulse and noise, and produces a prevideo signal.

The CCD output signal obtained at pin 1 of CN2 is supplied to pin 2 of sample hold IC6. The signal level of modulated CCD output signal is fed to limiter circuit in IC6 for eliminating large transfer noise. This signal is fed to clamp circuit where it is clamped to specified DC level by ø1 pulse supplied to pin 10 of IC6. The clamped signal is then sent to sample hold circuit where the signal components with noise components are sampled by the sample pulse ø2 sent through pin 9 of IC6. The other hand, limited signal is directly sent to other sample hold circuit to detects the noise component. The both sample hold signals are fed to a differential amplifier to eliminate the noise component and prevideo signal is detected. This signal obtained at pin 12 of IC6 is supplied through amplifier circuit consisting of Q18-Q20 to Process board.

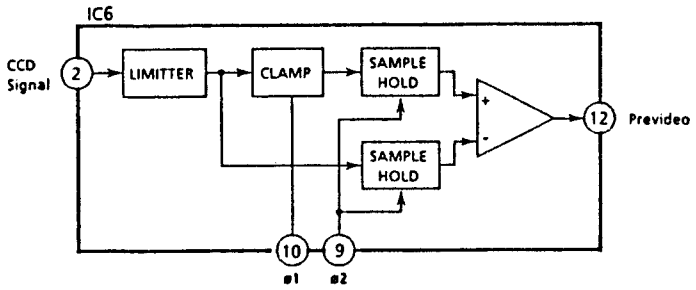


Fig. 3-1 Block diagram of AN2011S

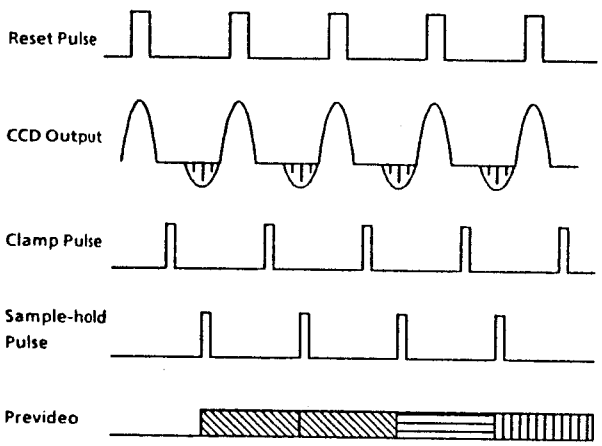


Fig. 3-2 Waveform of Sample Hold

3-2 CCD Drive Pulse Generator

This circuit receives vertical drive (VD) pulse and wide horizontal drive (WHD) pulse from Interface board and clock pulse from pulse generator IC5, and generates CCD drive pulses and other pulses.

The VCO circuit consists of D7, D8, C34, C35, C37, L9 (25MHz VCD ADJ) with oscillator inside IC5 generates 25MHz signal. This signal is obtained at pin 5 of IC5 and supplied to pin 44 of IC4.

In IC5, phase of the clock pulse routed to pin 6 with WHD pulse to pin 8 are compared and makes VCO control bias. This bias obtained at pins 11 and 12 of IC5 is supplied through buffer A13 to VCO circuit for forming PLL circuit to stabilize the oscillation frequency.

The pin identification of CCD drive pulse generator IC4 (MN5108) is as follows ;

Pin No.	Pin Name	In/Out	Discription
1	XO	Out	Not used
2	FCX2	In	Not used
3	CLK	Out	Clock Signal
4	SMPL	In	Sampling Clock
5	TEST	In	Not used
6	TEST1	In	Not used
7	SS1	—	Not used
8	SS2	—	Not used
9	PNSW	In	EIA/CCIR Switch (H:EIA, L:CCIR)
10	PBLK	—	Not used
11	CPOB	Out	OB Clamp Pulse
12	FH2	—	Not used
13	HD	In	H. Drive Pulse
14	VD	In	V. Drive Pulse
15	V1	Out	V.Transfer pulse 1 (øV1)
16	V2	Out	V.Transfer pulse 2 (øV2)
17	VDD1	In	+ 5V DC Power
18	VSS2	—	Ground
19	V3	Out	V.Transfer pulse 3 (øV3)
20	V4	Out	V.Transfer pulse 4 (øV4)
21	CH1	Out	Charge Pulse for øV1
22	CH2	Out	Charge Pulse for øV3
23	CLR	In	Internal Clear (H:Normal, L:Clear)
24	H3 4	Out	H. Transfer Pulse 3, 4 (øH3, øH4)
25	H1 2	Out	H. Transfer Pulse 3, 4 (øH3, øH4)
26	R	Out	Reset Pulse (øR)
27	RWI	In	øR Widgh Control
28	RWO	Out	øR Widgh Control
29	DP3	Out	Sample Hold Pulse
30	I 3	In	Not Used
31	DP2	Out	Not Used
32	I 2	In	Not Used
33	DP4	Out	Not Used
34	DP1	Out	Clamp Pulse
35	Q3	Out	Not Used
36	Q2	Out	Not Used
37	SP0	Out	Not Used
38	SP2	Out	Not Used
39	VSS1	In	Ground
40	VDD2	In	+ 5V DC Power
41	Q1	Out	Sample Pulse phase Control
42	I 1	In	Sample Pulse phase Control
43	SP1	Out	Not Used
44	X1	In	2f Clock

The H. transfer pulses 1, 2 (H1 2)and 3, 4 (H3 4) obtained at pins 25 and 24 of IC4 are supplied to pulse amplifiers Q8/Q9 and Q6/Q7 respectively where those are boosted to approx. 8.0Vp-p and supplied to Sensor board.

The reset pulse (R) obtained at pin26 of IC4 is supplied to pulse amplifier composed of Q10 and Q11 where it's amplified to approx. 8.0 Vp-p. This signal is supplied to Sensor board after added approximately + 2V DC through D11.

The V. transfer timing pulses 1(V1), 2(V2), 3(V3) and 4(V4) are generated in IC4 and obtained at pins 15, 16, 19 and 20 of IC4. These pulses are supplied to level converter IC3 where their levels are converted to specified DC level according to the fixed timing for producing V. Transfer pulses (øV1 - øV4).

The charge pulses 1(CH1) and 2(CH2) from pins 21 and 22 of IC4 are supplied to pins 9 and 12 of IC3 and mixed with V1 and V3 pulses respectively through the OR gate IC2 and IC7.

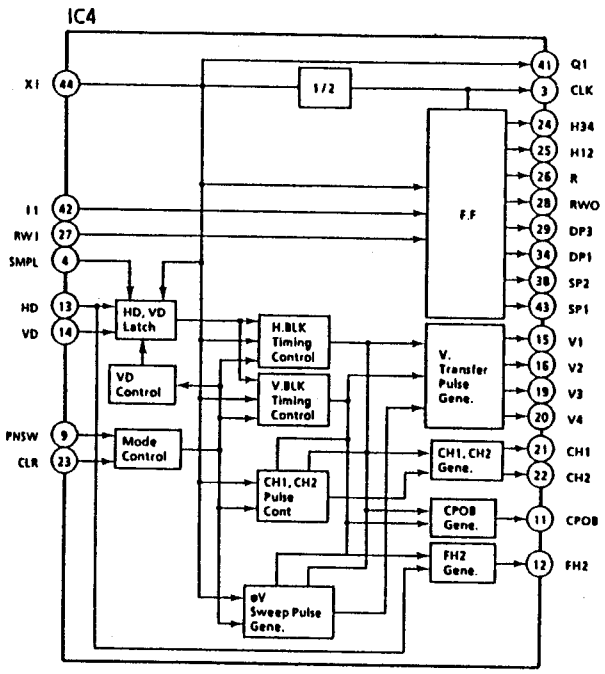


Fig. 3-3 Block Diagram of MN5108

3-3 Bias Circuit

The approximately 1.0V DC generated by Q2 obtained at pin5 is supplied to pin3 of IC3 for setting the middle level (øVM) of øV1 and øV3.

Also the approximately 1.0V DC obtained at pin1 of Q2 is supplied to pin19 of IC3 for setting the middle level of øV2 and øV4.

The approximately 13.0V DC generated by Q1 obtained at pin6 is supplied to pin16 of IC3 for setting the high level (øVH) of øV1 and øV3.

The approximately -7.0V DC generated by Q1 obtained at pin3 is supplied to pin1 of IC3 for setting the low level of øV1 - øV4.

The CCD bias set by VR1 (V SUB) with Q3 is supplied to Sensor board.

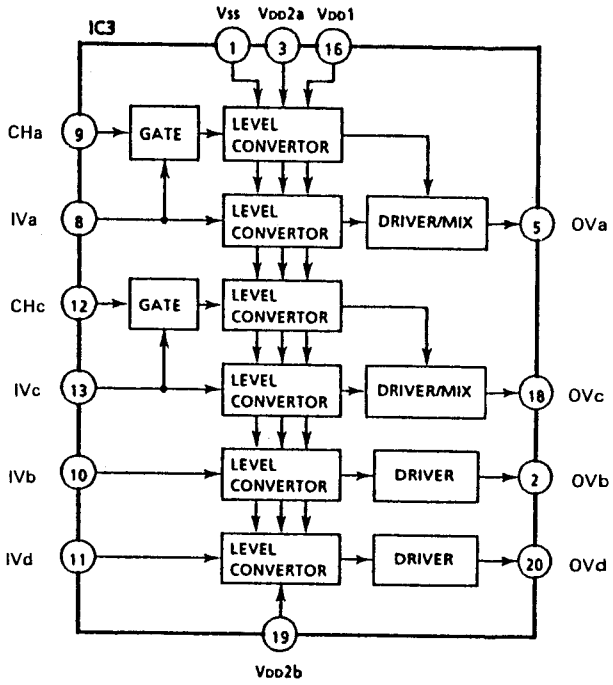


Fig. 3-4 Block Diagram of IC3 (MN3107CS)

The approximately + 8.0V DC generated by Q3 and obtained at pin 5 is supplied to pulse amplifiers Q6/Q7 and Q8/Q9 respectively as DC bias.

The approximately + 8.0V DC generated by Q4 is supplied to pulse amplifier Q10/Q11 as DC bias.

3-4 Regulator Circuit

- **+ 15.5V Regulator**

+ 15.5V DC is generated by regulating + 20V DC power using IC1 (a).

The output voltage at pin 1 of IC1(a) is applied through buffer Q5 to pin 2 of IC1(a) to form a feedback loop and thus stabilizing the voltage. The reference voltage is obtained by diving the + 20V DC using R78 and R79.

- **-8.0V Regulator**

-8.0V DC is generated by regulating -11V DC power using IC1(b).

The output voltage at pin7 of IC1(b) is applied through buffer Q5 to pin 6 of IC1 (b) to form a feedback loop and thus stabilizing the voltage. The reference voltage is obtained by dividing the + 5V and -8.0V output DC using R80 and R81.

4. Process Board

4-1 Video Processing Circuit

- Mask Control Circuit

  This circuit mask the prevideo signal to optical black level by the mask signal when the prevideo signal is not used.

  The mask signal is sent from the mask control IC5 on the Memory Board when working the video memory circuit on the Memory Board or receive remote control data from the CCU (Camera Control Unit) or send back the control data to the CCU for check the control data.

  The memorized video signal is used the mode SENS UP or Electronic Zoom on this camera.

  The mask signal controls the mask control switch IC3 and mask clamp gate Q2 through the AND gate IC4 on the Process Board.

• Optical Black Clamp Circuit

Prevideo signal from inverter Q7 is fed through pin29 to optical black (OB) clamp circuit in IC5. An optical black for blocking the incoming light is built at the end of horizontal scanning period on the surface of CCD image sensor.

When the CCD reads out optical black portion, the dark current of the CCD is detected and this signal portion is clamped to a DC potential

The clamped video signal is mixed with the wide horizontal drive (WHD) pulse which is separated in IC5 from the mixed signal of clamp pulse-1 (CP1) and WHD pulse and the noise during the blanking period is removed. This signal is supplied to gain control circuit and automatic light control(ALC) circuit.

• Gain Control Circuit

When AGC ON/OFF switch on the rear of camera is set to OFF position, low(L) level is obtained at pin24 of CN1 and the L level is converted to high(H) level by inverter IC1. The H level is then supplied to pin 7 of IC2 for connecting pins 6 and 5 of analog switch. Therefore gain control DC bias set by VR2(GAIN SET) is supplied to gain control circuit in IC5 through pin 27 for setting the amplitude of gain control circuit to standard state.

When AGC ON/OFF switch is set to ON position, H level is obtained at pin24 of CN1 and the H level is supplied to pin3 of IC2. As a result, pin1 and 2 of IC2 are conducted and gain control DC bias generated by AGC detector circuit in IC5 and VR3 (AGC SET) is supplied through pin 28 of IC5 to gain control circuit in IC5 for controlling the amplitude of gain control circuit.

The gain controlled video signal is then fed through pin27 of IC5 to 12.8MHz trap CF2 where the remaining switching noise on the video signal is eliminated. This signal is fed through buffer Q8 and pin 24 of IC5 to clamp circuit where the video signal is clamped to specified clamp DC level. The clamped video signal is supplied to gamma correction circuit in IC5.

• Gamma Correction Circuit

The gamma(γ) correction circuit corrects the non-linear photoelectric conversion characteristic of cathode ray tube (CRT) and reproduces a linear picture of high fidelity on the monitor.

In order for a televised picture to have the same contrast gradation as the original scene, the gamma of the system including CCD image sensor, signal processing inside camera and monitor must be equal to 1.0.

The gamma characteristic of CCD image sensor is approximately 1.0 and the gamma characteristic of the monitor is approximately 2.2, so that the gamma characteristic of the gamma correction circuit should be approximately 0.45 which makes the total gamma to be approximately 1.0.

The gamma corrected video signal is supplied to AGC detection circuit and level control circuit respectively.

(Fig. 4-1)

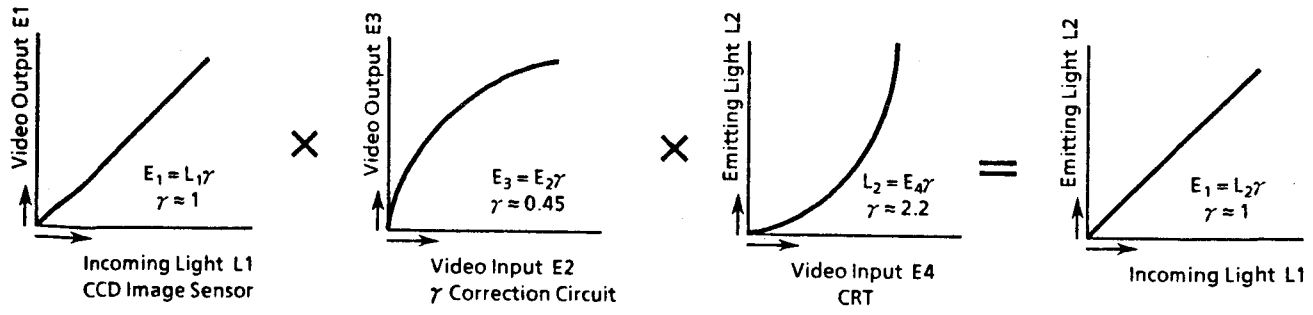


Fig. 4-1 Gamma Correction

The H. transfer pulses 1, 2 (H1 2)and 3, 4 (H3 4) obtained at pins 25 and 24 of IC4 are supplied to pulse amplifiers Q8/Q9 and Q6/Q7 respectively where those are boosted to approx. 8.0Vp-p and supplied to Sensor board.

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The V. transfer timing pulses 1(V1), 2(V2), 3(V3) and 4(V4) are generated in IC4 and obtained at pins 15, 16, 19 and 20 of IC4. These pulses are supplied to level converter IC3 where their levels are converted to specified DC level according to the fixed timing for producing V. Transfer pulses (øV1 - øV4).

The charge pulses 1(CH1) and 2(CH2) from pins 21 and 22 of IC4 are supplied to pins 9 and 12 of IC3 and mixed with V1 and V3 pulses respectively through the OR gate IC2 and IC7.

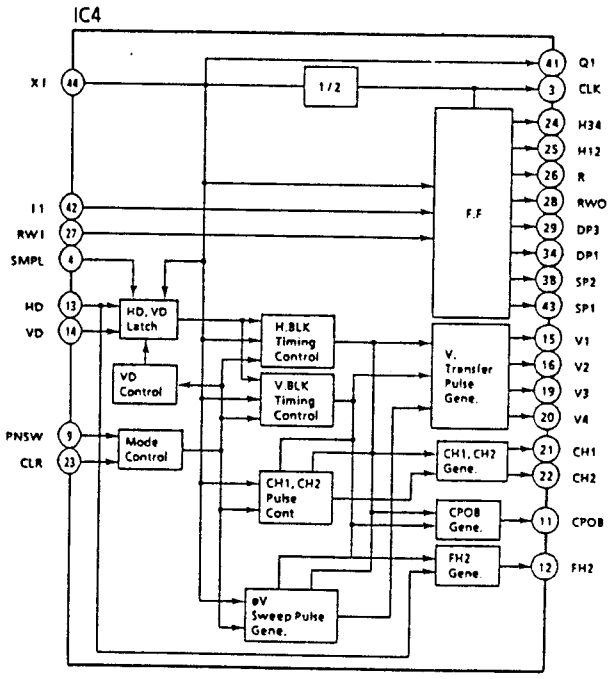

Fig. 3-3 Block Diagram of MN5108

3-3 Bias Circuit

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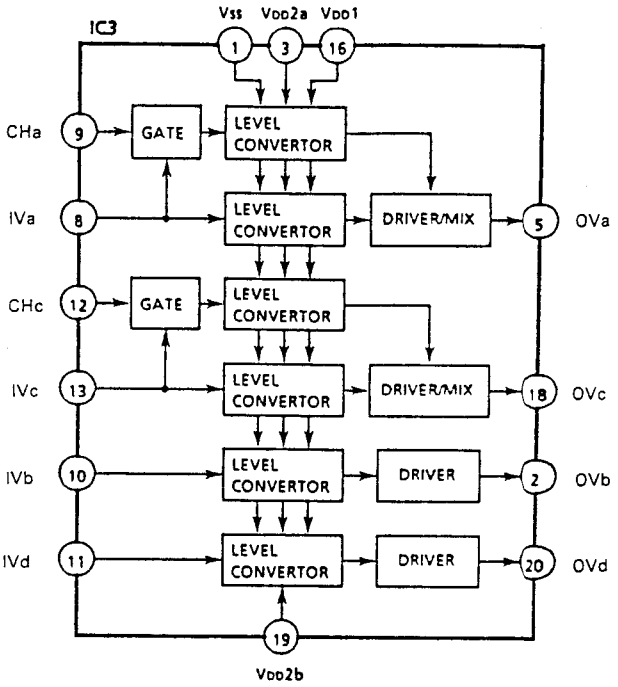


Fig. 3-4 Block Diagram of IC3 (MN3107CS)

The approximately + 8.0V DC generated by Q3 and obtained at pin 5 is supplied to pulse amplifiers Q6/Q7 and Q8/Q9 respectively as DC bias.

The approximately + 8.0V DC generated by Q4 is supplied to pulse amplifier Q10/Q11 as DC bias.

3-4 Regulator Circuit

- **+ 15.5V Regulator**

+ 15.5V DC is generated by regulating + 20V DC power using IC1 (a).

The output voltage at pin 1 of IC1(a) is applied through buffer Q5 to pin 2 of IC1(a) to form a feedback loop and thus stabilizing the voltage. The reference voltage is obtained by diving the + 20V DC using R78 and R79.

- **-8.0V Regulator**

-8.0V DC is generated by regulating -11V DC power using IC1(b).

The output voltage at pin7 of IC1(b) is applied through buffer Q5 to pin 6 of IC1 (b) to form a geedback loop and thus stabilizing the voltage. The reference voltage is obtained by dividing the + 5V and -8.0V output DC using R80 and R81.

4. Process Board

4-1 Video Processing Circuit

- Mask Control Circuit

  This circuit mask the prevideo signal to optical black level by the mask signal when the prevideo signal is not used.

  The mask signal is sent from the mask control IC5 on the Memory Board when working the video memory circuit on the Memory Board or receive remote control data from the CCU (Camera Control Unit) or send back the control data to the CCU for check the control data.

  The memorized video signal is used the mode SENS UP or Electronic Zoom on this camera.

  The mask signal controls the mask control switch IC3 and mask clamp gate Q2 through the AND gate IC4 on the Process Board.

- **Optical Black Clamp Circuit**

Prevideo signal from inverter Q7 is fed through pin29 to optical black (OB) clamp circuit in IC5. An optical black for blocking the incoming light is built at the end of horizontal scanning period on the surface of CCD image sensor.

When the CCD reads out optical black portion, the dark current of the CCD is detected and this signal portion is clamped to a DC potential

The clamped video signal is mixed with the wide horizontal drive (WHD) pulse which is separated in IC5 from the mixed signal of clamp pulse-1 (CP1) and WHD pulse and the noise during the blanking period is removed. This signal is supplied to gain control circuit and automatic light control(ALC) circuit.

- **Gain Control Circuit**

When AGC ON/OFF switch on the rear of camera is set to OFF position, low(L) level is obtained at pin24 of CN1 and the L level is converted to high(H) level by inverter IC1. The H level is then supplied to pin 7 of IC2 for connecting pins 6 and 5 of analog switch. Therefore gain control DC bias set by VR2(GAIN SET) is supplied to gain control circuit in IC5 through pin 27 for setting the amplitude of gain control circuit to standard state.

When AGC ON/OFF switch is set to ON position, H level is obtained at pin24 of CN1 and the H level is supplied to pin3 of IC2. As a result, pin1 and 2 of IC2 are conducted and gain control DC bias generated by AGC detector circuit in IC5 and VR3 (AGC SET) is supplied through pin 28 of IC5 to gain control circuit in IC5 for controlling the amplitude of gain control circuit.

The gain controlled video signal is then fed through pin27 of IC5 to 12.8MHz trap CF2 where the remaining switching noise on the video signal is eliminated. This signal is fed through buffer Q8 and pin 24 of IC5 to clamp circuit where the video signal is clamped to specified clamp DC level. The clamped video signal is supplied to gamma correction circuit in IC5.

- **Gamma Correction Circuit**

The gamma(γ) correction circuit corrects the non-linear photoelectric conversion characteristic of cathode ray tube (CRT) and reproduces a linear picture of high fidelity on the monitor.

In order for a televised picture to have the same contrast gradation as the original scene, the gamma of the system including CCD image sensor, signal processing inside camera and monitor must be equal to 1.0.

The gamma characteristic of CCD image sensor is approximately 1.0 and the gamma characteristic of the monitor is approximately 2.2, so that the gamma characteristic of the gamma correction circuit should be approximately 0.45 which makes the total gamma to be approximately 1.0.

The gamma corrected video signal is supplied to AGC detection circuit and level control circuit respectively.

(Fig. 4-1)

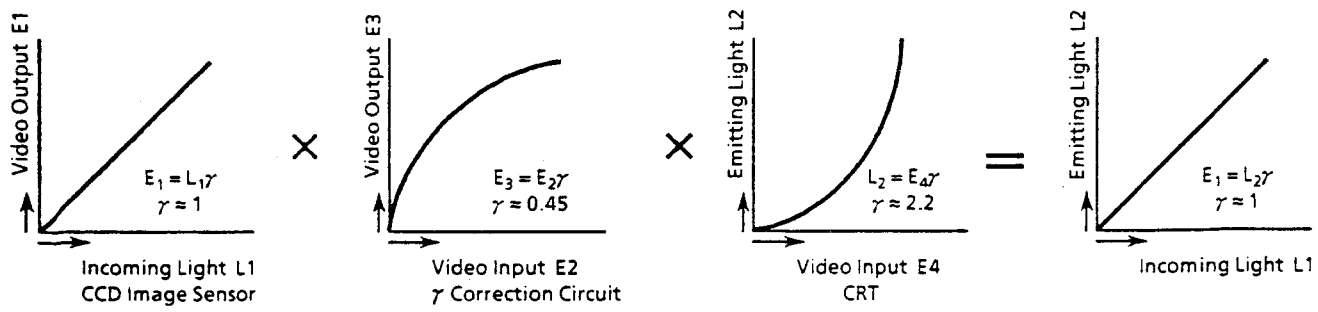


Fig. 4-1 Gamma Correction

• **AGC Detection Circuit**

The video signal from gamma correction circuit is peak-rectified in the AGC detect circuit and converted into DC voltage corresponding to the video signal level that is, incoming light intensity.

This AGC voltage obtained at pin4 of IC5 is send to the Interface Board through pin 20 of CN1 and selected this voltage or the AGC voltage for the memorized video signal by IC5 on the Interface Board.

The selected AGC voltage is returned to the Process Board and supplied pin 5 of IC5 through pin 22 of CN1. In IC5, the voltage applies to the AGC OP AMP where it is compared with the reference DC voltage.

The error DC voltage obtained at pin6 of IC5 is fed back through IC2 to gain control circuit in IC5 to control the amplitude.

When the camera is used in the normally illuminated scene, the amplitude of gain control circuit does not change. However, when the camera is aimed at the weakly illuminated scene, lens iris is fully opened and the video signal level is decreased. The decreased video signal level is detected by the AGC detection circuit and the amplitude to relatively low illumination is controlled. (Fig. 4-2)

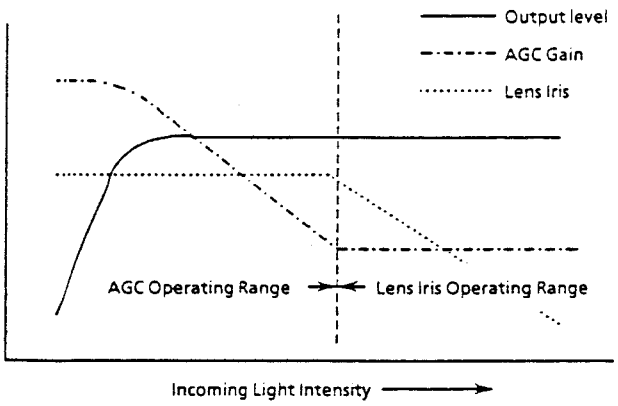


Fig. 4-2 AGC Operation

• **Horizontal Aperture Signal Generator Circuit**

The video signal from gamma correction circuit obtained at pin 22 of IC5. It is fed the Memory Board through pin 10 of CN1.

The video signal is memorized into the video RAM IC10 and IC11 on the Memory Board for using the memorized video signal as the SENS UP mode.

These video signals are selected by IC3 on the Memory Board. IC3 is controlled by memory control signal from CPU IC6 on the Microprocessor Board.

The selected video signal is fed buffer Q9 on the Process Board through pin 9 of CN1 and supply to horizontal aperture signal generator circuit.

When the camera is aimed at object(A) for example, the signal(B) obtained at buffer Q9 and passed through pin 20 of IC5, signal(C) delayed 83ns by delay line CF3 and amplified by aperture amplifier (AP AMP) in IC3 and signal(D) which results from the delayed video signal being reflected back through CF3 and the delayed again (166ns) appear at the output of the H. aperture generator circuit where they are mixed in fixed proportions to make up the H. aperture signal(E).

The H. aperture signal obtained in this way and fed through pin17 of IC5, buffer Q13 and pin16 of IC5 is mixed with the video signal sent through buffer Q10 and H. aperture-mixed video signal(F) is made. (Fig. 4-3)

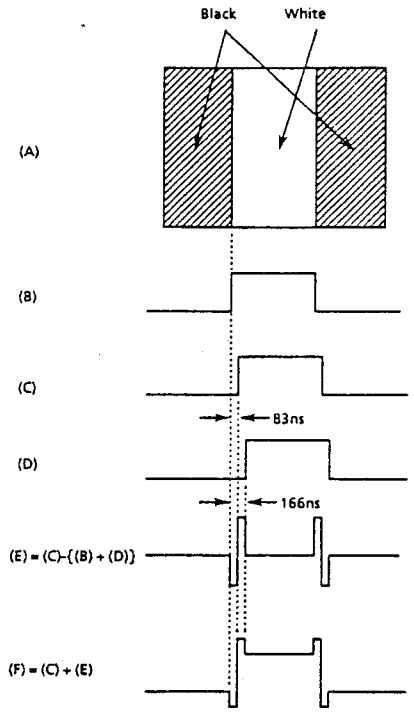


Fig. 4-3 Horizontal Aperture signal.

• **Video Signal Processing Circuit**

The video signal(A) from Y/Aperture mix circuit is forwarded to clamp circuit where the blanking level of the mixed signal is clamped to specified DC level.

The clamped video signal is then sent to the BL mix, high clip, low clip circuit where it is mixed with the blanking pulse(B). The high clip circuit clips the high level signal and the low clip circuit clips the low level portion of mixed signal(C) for setting the pedestal level(D).

The mixed signal undergoes the high and low clip is mixed with the sync signal(E) through pin12 of IC5 for forming a composite video signal(F). The composite video signal obtained at pin13 of IC5 is supplied through pin17 of CN1 to video output circuit on the Interface board. (Fig. 4-4)

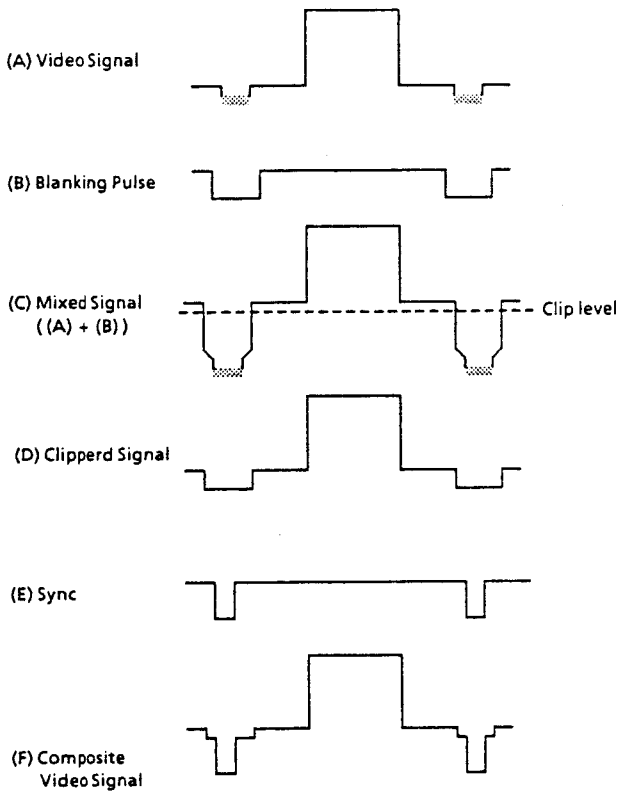


Fig. 4-4 Video Signal

4-2 ALC Circuit

- **ALC Video Output Circuit**

The prevideo signal passes IC3 is applied to sync mix Q5 where prevideo signal and composite sync signal(SYNC) from pin14 of CN2 are mixed to produce composite video signal. This signal is amplified by Q4 and supplied to Rear board. When Lens Selection Switch SW2 on the Rear Board is set to video position, prevideo signal made by this circuit is sent out from lens connector.

- **ALC DC Output Circuit**

The prevideo signal mixed with the WHD in IC5 sent through ALC amplifier, ALC gamma correction and DC control circuits to ALC detection circuit in IC5 where the video signal is converted into DC voltage corresponding to the incoming light intensity. This detected DC voltage obtained at pin38 of IC5 is fed through VR5(ALC1) and pin 3 of IC11 to error amplifier where the DC voltage is compared with reference DC voltage and the error DC voltage is supplied through buffer Q12 and Q11 to Rear Board. When Lens Selection Switch SW2 on the Rear Board is set to DC position, this error DC voltage is supplied to lens iris drive coil of the ALC lens to directly control the lens aperture.

4-3 Gen-lock Control Circuit

This circuit generates reference 14.3MHz clock signal which is sent to sync generator in the Drive board for generating the sync and transfer pulses.

This circuit also receives a gen-lock signal such as composite video signal and compares it in phase with horizontal pulse generated in the sync generator.

The resultant in comparison controls generating reference 14.3MHz clock signal and the clock signal is then fed to the sync generator. Thus horizontal pulses synchronized with the gen-lock signal is generated. In the gen-lock mode, the vertical reset pulse is generated from the gen-lock signal and it is fed to the sync generator to generator vertical pulses synchronized with the gen-lock signal.

The pin identification of gen-lock control IC7 (PD65012GB) is as follows.

Pin No.	Name	In/Out	Description
1	VR	Out	Vertical Reset Pulse
2	HV	Out	H/V Select Control
3	EXH	In	External Horizontal Sync Signal
4	I1	In	Mode Select (H:LL, L:INT/EXT)
5	MI2	—	Not Used
6	MI3	—	Not Used
7	MI4	—	Not Used
8	VD2	In	External Vertical Sync signal
9	TSTI	—	Not Used
10	GND	—	Ground
11	DPC		Not Used
12	TCK1	—	Not Used
13	TCK2	—	Not Used
14	OS	—	Not Used
15	OD	—	Not Used
16	OV	—	Not Used
17	GND	—	Ground
18	VDO	—	Not Used
19	PN1	In	SC Counter Select
20	VDSW	In	System Mode Select (H:EIA, L:CCIR)
21	PCO1	Out	Phase Comp. Delay Det. (H:Delay)
22	PCO2	Out	Phase Comp. Forward Det. (L:Forward)
23	CLRP	—	Not Used
24	EI	Out	EXT/INT Mode Select (H:EXT, L:INT)
25	HPC	In	Horizontal Phase Control
26	GND	—	Not Used
27	Sø	—	Not Used
28	D1	—	Not Used
29	Dø	—	Not Used
30	S1	—	Not Used
31	SYNC	—	Not Used
32	PN2	Out	EIA/CCIR Mode Select (H:EIA, L:CCIR)

6. Interface Board

This Interface Board contains following cirucits.

1. Video Output Circuit
2. Regulator Circuit
3. Memory Video Contro Circuit
4. Memory Video AGC Amplifier Circuit
5. V. PHASE Control Circuit
6. Control Data Detect Circuit

6-1 Video Output Circuit

- Video Output Circuit

A composite video signal produced at the Process Board is fed to buffer Q6 through pin 17 of CN2 on the Interface Board.
The video signal is fed to pin 13 of CN2 through video amplifier Q7. Q8, Q9, Q10/Q11 and supplied to VIDEO output connector of camera through pin 13 of CN2, and pin 1 of E2 on the Mother Board and the Rear Board.

- Remote Control Data Mixing circuit

When this camera controlled by CCU (Camera Control Unit) such as WV-CU204 etc., this camera receives the remote control data from CCU and return the data to CCU to confirm the sent data is right or not.
In this circuit, the return data is mixed with the composite video signal to send the data to CCU through mixing amplifier Q7 and pin 22 of CN2 on the Interface Board.

6-2 Regulator Circuit

The W.HD pulse is supplied from pin 24 of IC10 on the Process Board and amplified by pulse drive Q1 and Q2 on the Interface Board for necessary level and supplied it to the primary winding of T1.
The boosted/attenuated pulses obtained at the secondary winding of T1 are rectified to generate necessary voltage.

- +20V DC generated by rectifying the boosted pulse of T1 with D3 is supplied to the Drive board.

- -11V DC generated by rectifying the pulse with D6 is supplied to the Drive board.

- +5.3V Regulator

+5.3V DC is generated by regulating +9V DC power using IC2(a). The output voltage at pin 1 of IC2(a) is applied through R15 and buffer Q24 to pin 6 of IC2(a) to form a feedback loop, and thus stabilizing the voltage. This +5.3V DC is applied to pulse drive on the power circuit for increase the common line of power circuit.
The reference voltage is obtained by dividing the +9V DC using R10 - R14.

- +5V Regulator

+5V DC is generated by regulating +9V DC using IC2(b). The output voltage obtained at pin 7 of IC2(b) is applied through buffer Q4 to pin 6 of IC2(b) to form a feedback loop, and thus stabilizing the voltage. The reference voltage is obtained by dividing the +9V DC using R10 and R11. The current from +9V DC through primary winding on R1, between collector and emitter of Q2 and +5.3V line is mixed at Q4 for supplying the large current on the +5V DC power source.

6-3 Memory Video Control Circuit

This WV-BL600 series camera employs a picture memory and features an electronic sensitivity up and electronic zoom function.
This circuit is used for AGC line control of memorized video signal or normal video signal.

- AGC Line Select Switch

An analog switches IC5 selects the AGC voltage for normal video signal or memorized video signal. AGC voltage for normal video signal received pin 2, 6 of analog switches IC5 through pin 5 of CN2 from pin 20 of CN1 on the Process Board is returned to pin 22 of CN1 on the Process Board through pin 3 of CN2 on the Interface Board. AGC voltage for memorized video signal used for the Electronic Sensitivity up mode and the electronic zoom mode is generated by the Memory Video AGC Amplifier and supplied to pin 1 and pin 5 of IC5. IC5 cuts the AGC voltage for normal video signal from the Process Board when using the memorized video signal. Then Memory Control Signal is obtained pin 3 and pin 7 of IC5 through pin 6 of CN2 and inverter IC6 from pin 19 of microprocessor IC6 through pin 13 of CN2 on the Microprocessor Board. AGC voltage the normal video signal or the memorized video signal is selected as a result, and sent through pin 3 of CN2 to the Process Board.

- AGC Level Detector

This circuit detects the AGC level and generates signal sensitivity up and down for ALC level controls. IC7 compares AGC voltage with supplied reference voltage. AGC voltage supplied pin 2 of IC7(a) and pin 6 of IC7(b) is compared with reference voltage supplied approximate 2.8volts obtained pin 3 of IC7(a) or 1.8volts obtained pin 5 of IC7(b) respectively.
When the AGC voltage is over 1.8 volts pin 1 and pin 7 of IC7 becomes low level, over 2.8volts pin 1 of IC7 only becomes low level. When the AGC voltage is less than 1.8volts pin 1 and pin 7 of IC7 become High level. Thus the AGC voltage data is detected by dual comparator IC7 and sent through pin 7 and pin 8 of CN2 on the Interface Board and pin 12 and pin 11 of CN2 to pin 32 and pin 31 of microprocessor IC6 on the Microprocessor Board.

This data is used for the electronic sensitivity up mode and the iris control from the CCU.
Q27 and Q26 control the reference voltage of comparator IC7(a) by iris open signal supplied from microprocessor IC6 on the Microprocessor Board through pin 19 of CN2 on the Interface Board. The AGC voltage data supplied pin 1 of IC7(a) is controlled by this reference voltage and iris open signal. So the AGC voltage data is controlled the electronic sensitivity up mode and the iris control from the CCU by iris open signal.

6-4 Memory Video AGC Amplifier Circuit

The AGC voltage used for memorized video signal is amplified in this circuit composed Q19, Q20, Q21 and Q29. The memorized video signal used for Electronic Sensitivity Up mode and Electronic Zoom ON mode is supplied through pin 23 of CN2 on the Interface Board from emitter of video amplifier Q11 on the Memory Board. The AGC voltage is not appeared when working the normal video signal by Memory Control Signal obtained emitter of Q21 through D10 and pin 6 of CN2 from the Microprocessor Board.

6-5 Vertical Phase Control Circuit
(For WV-BL600 and WV-BL604)

The vertical phase of the camera signal can be adjusted to match the vertical phase of the power line. The vertical phase of the power line is obtained pin 4 of vertical phase control (Dual Monostable Multivibrator) IC4 through pin 11 of CN1 from the Power Board. And the phase output wave obtained pin 10 of IC4 is controlled the duty cycle by changing a time constant composed C37 and V. PHASE VR2 on the Switch Board. Thus the phase output wave is supplied to pin 33 of Gen-Lock Control IC7 on the Process Board through pin 9 of CN1 on the Inferface Board.

6-6 Control Data Detect Circuit

When the Control Mode Selection Switch is REMOTE Position, the functions of this camera as the electronic sensitivity up, the speed of the electronic shutter, the electronic zoom and the iris control can be controlled by the CCU (Camera Control Unit) such as WV-CU204 etc..
A remote control data sent from the CCU is obtained base of buffer Q13 through the composite video signal line VIDEO connector CN101 rear of the camera and pin13 of CN2, C26/C53 and R52 on the Interface Board.
A vertical blanking period of the composite video signal is used for receiving the remote control data composed 4bytes command in serial from the CCU.

The data is detected in this circuit composed buffer Q13, blanking gate Q14, control data detect Q15, Q16 and Q18.
The data detected in this circuit is controlled the voltage to 5V (high level) or 0V (low level) by Q18 and sent to the remote data controller IC5 on the Microprocessor Board.

7. Microprocessor Board

This Microprocessor Board contains following circuit and function

1. Microprocessor
2. Remote Data Control
3. Remote Control of ALC
4. Watchdog Timer

7-1 Microprocessor

The signals such as M.CNTL, Zoom 0-2, SS1-2, Gain UP and IRIS OPEN are controlled this microprocessor IC6 by the Switches of the key matrix scanning line key 0-2 and key return 0-7 such as SW4 (SHTR/NOR/SENS UP), SW5 (SHTR SPEED), SW6 (ZOOM ON/OFF) and SW2 (REMOTE/LOCAL) on the Switch Board and the remote control data of the CCU through remote data controller IC5 in parallel on the Microprocessor Board.

7-2 Remote Data Control

This remote data controller IC5 receives the remote control data from the CCU and sent the command to the Microprocessor IC6.
The control data in serial obtained pin59 of IC5 through pin6 of CN2 is realized the command in IC5 and sent the command to IC6 in parallel. The data is converted serial to parallel in IC5.
And then the control data sent from the CCU is returned to the CCU to confirm that the control data is receiving or not and right or not in the CCU.
The return data obtained pin56 of IC5 is sent to control data mix block Q7 on the Interface Board through pin 5 of CN2 on the Microprocessor Board.
The return data composed with 4byte command is mixed with vertical blanking period of the composite video signal and sent to the CCU through the composite video signal line.

7-3 Remote Control of ALC

The camera can be adjusted the control level of the auto iris control by the CCU when the Lens Selection Switch is set to the DC position and the auto iris lens which requires the DC control voltage such as WV-LA12B2 etc., is mounted on the camera.
The Iris Control command data obtained pin59 of the remote data controller IC5 from the CCU is converted serial into 8bits parallel and the data is obtained pin50 (D0)-pin43(D7) of IC5.
The data adjusted the auto iris control level by the CCU is sent to pin1-pin8 of the D/A converter Z1 and converted the 8bits data to the DC voltage in Z1 to control the auto iris lens.
This voltage obtained pin 16 of Z1 is sent to the analog switch IC10 and IC9 through the buffer IC1(b), analog switch IC2 and buffer IC1(a).
The DC voltage selected IC9 and IC10 is sent to pin12 of CN1 and supplied to ALC amplifier IC11 on the Process Board through pin21 of CN1.
The analog Switch IC9 and IC10 select the auto iris control voltage.
When the camera is controlled by the CCU and receives the Iris Control command, the auto iris control voltage is supplied to ALC amplifier IC11 on the Process Board as stated above.
But the camera is not controlled by the CCU, the auto iris control voltage can be adjusted by the ALC LEVEL VR3 on the Switch Board and adjusted DC voltage is supplied to pin1 of analog switch IC9 through pin12 of CN1 on the Microprocessor Board.
Thus the auto iris control voltage selected IC9 and IC10 by analog switch control signal from pin52 of Microprocessor IC6 is supplied to the Process Board.

7-4 Watchdog Timer

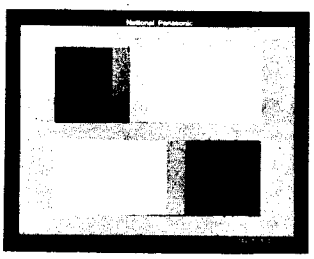
The watchdog timer IC3 keep watch on the microprocessor operation.
A certain period pulse composed by the software for the microprocessor IC6 and obtained pin49 of IC6 is sent to pin1 of the watchdog timer IC3.
This pulse can be confirmed the program is execute by the microprocessor IC6 certainly but if the pulse is not appeared for a certain period the microprocessor must be unusual condition.
Then the watchdog timer IC3 sends the RESET signal to initialize the microprocessor IC6.
As a result the microprocessor IC6 begins to execute the program again except for a hardware trouble.
The time constant R11 and C16 obtained pin2 of the watchdog timer IC3 decides a certain period of the pulse from IC6 to keep watch on the microprocessor operation.

ADJUSTMENT PROCEDURE

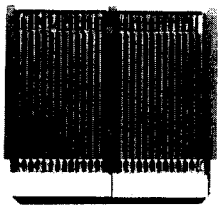
1. Test Equipment Required

The following test equipment is required for adjusting CCTV camera WV-BL600/WV-BL602/WV-BL604.

- Oscilloscope (50MHz band width, dual trace with delayed sweep function.)
- Digital voltmeter
- Frequency counter
- Underscanned video monitor
- Sync signal generator
- Lens : Automatic iris control lens such as WV-LA12 or Manual iris lens (F1.4 16mm)
- Lighting (140 footcandles (1400 lux) 3200°K)
- Lightmeter
- Logarithmic gray scale chart (Part No. YWV2310RB99)



- Extension board (Part No. YWV0EA0089AN)



2. Disassembling Procedure for Adjustment

- Remove two screws fixing mount adaptor and remove the mount adaptor. (Fig. 2-1)

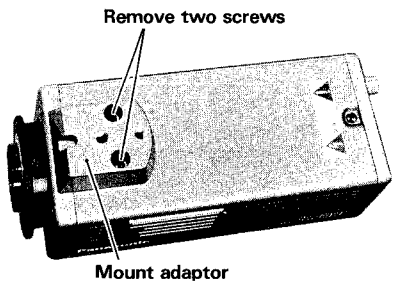


Fig. 2-1

- Remove six screws fixing upper cover and remove the cover by pulling it upward. (Fig. 2-2)

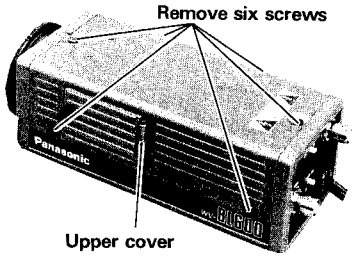


Fig. 2-2

- Remove two screws holding bottom cover and remove the cover by pulling it downward. (Fig. 2-3)

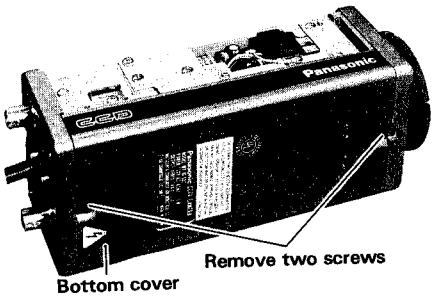


Fig. 2-3

- Remove four screws fixing PCB holder and remove the holder. (Fig. 2-4)

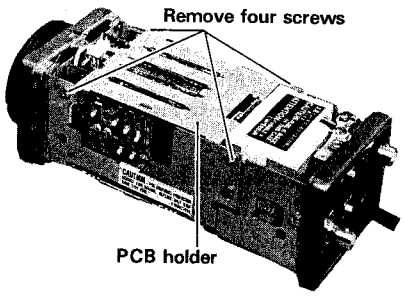


Fig. 2-4

- Remove respective PCB assembly by pulling it upward and replace the PCB assembly using the extension board. (Fig. 2-5)

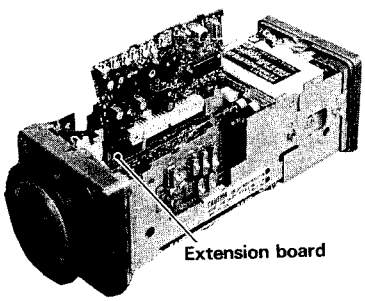


Fig. 2-5

3. CCD Image Sensor Replacement

- Remove upper cover, bottom cover and PCB holder previously while referring to the "2. Disassembling Procedure for Adjustment" on page 18.
- Remove Drive board, Process board, Interface board, Memory board, Microprocessor board and Switch board from Mother board by pulling them upward.
- Disconnect CN2, CN13, CN14, CN15 and CN10 from the Mother board and remove two screws holding power supply unit (for WV-BL600 and WV-BL604) mounting angle. (Fig. 3-1)

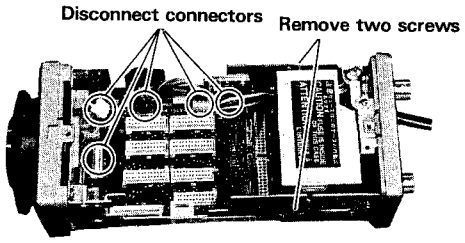


Fig. 3-1

- Remove four screws fixing Mother board and remove Mother board. (Fig. 3-2)

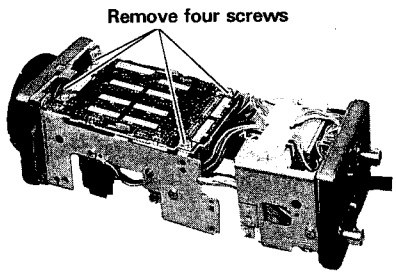


Fig. 3-2

- Remove four screws fixing front chassis assembly and remove front chassis assembly. (Fig. 3-3)

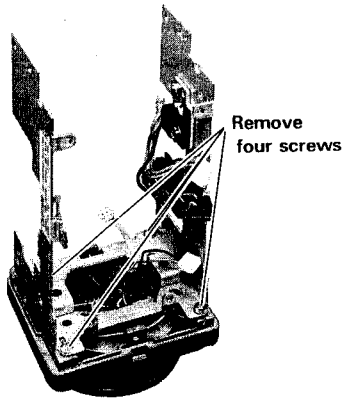


Fig. 3-3

- Unsolder the CCD pins and remove CCD image sensor from Sensor board. (Fig. 3-4)

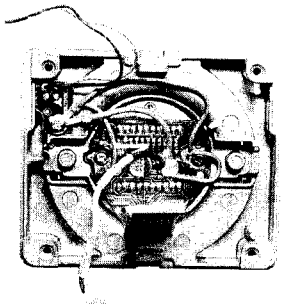


Fig. 3-4

- Install the new CCD image sensor assembly to the CCD board. (Fig. 3-5)

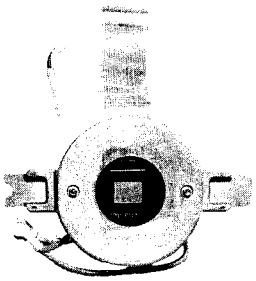


Fig. 3-5

- After replacing the CCD image sensor assembly, install the camera in reverse procedure of disassembling.

4. Connection and Setting Up for Adjustment

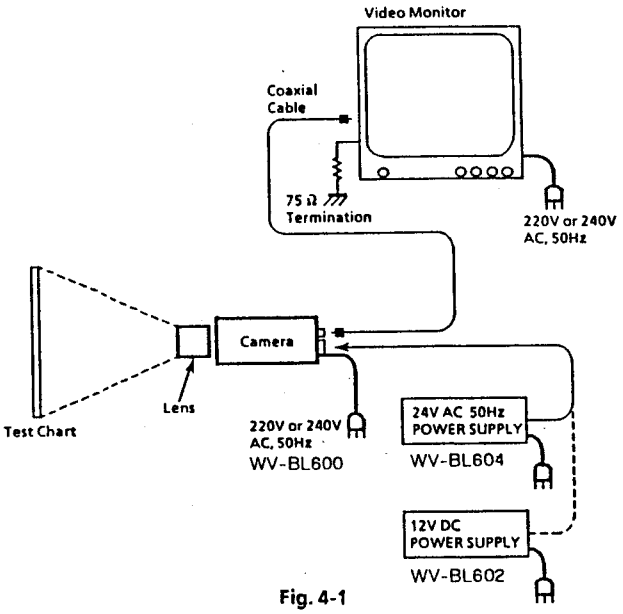


Fig. 4-1

Connection

- Connect the coaxial cable between video output connector and underscanned black and white video monitor.
- Terminate video input of the monitor with 75 ohms.
- Position the logarithmic grayscale chart in front of the camera as shown in Fig. 4-1.

Setup

- Set respective switches on the camera as follows.

AGC ON/OFF Switch	ON position
Lens Selection Switch	DC position
Gen-lock Termination Switch	ON position
Sync Selection Switch	INT position
(WV-BL600 and WV-BL604)	
Camera Mode Selection Switch	NOR position
Shutter Speed Selection Switch	1/1000 position
Control Mode Selection Switch	LOCAL position
Electronic Zoom ON/OFF Switch	OFF position

- Set the all controls on the printed circuit boards in the camera to the mechanical center position.
- Turn on the measurement sets and the camera for warm up at least 30 minutes period to adjustment.

5. Adjustment Procedure

- Refer to page 25 for the position of test points and adjusting controls.

(1) +9.0V adjustment

Test point :	**TP1 (+9.0V)**	**Interface board**
Adjust :	**VR1 (+9.0V ADJ)**	**Interface board**

- Connect the digital voltmeter to TP1 on the board.
- Adjust VR1 (+9.0V ADJ) for 9.0V ± 0.05V.

(2) INT SYNC adjustment

Test point :	**TP5 (SYNC OSC)**	**Process board**
Adjust :	**CT1 (INT SYNC)**	**Process board**

- Connect the frequency counter to TP5 on the Process board.
- Adjust CT1 (INT SYNC) for 4.406250MHz ± 10Hz.

(3) 25MHz VCO adjustment

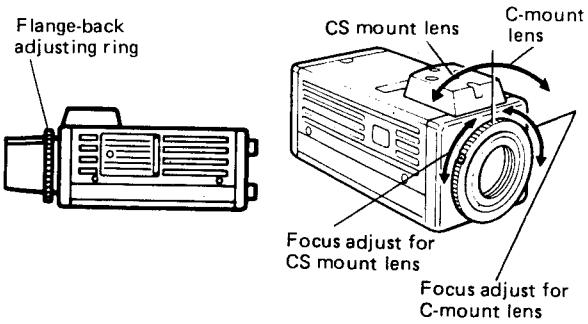
Test point :	**TP1 (25MHz VCO)**	**Drive board**
Adjust :	**L9 (25MHz VCO ADJ)**	**Drive board**

- Connect the digital voltmeter to TP1 on the Drive board.
- Adjust L9 (*25MHz VCO ADJ*) for 2.5V ± 0.1V.

(4) Flange - back adjustment

Adjust :	**Flange-back adjusting ring**
Observe :	**Video monitor**

- Set the distance between the camera and the test chart for 10m.
- Set the lens focus infinity (∞) position.
- Loosen the flange-back adjusting ring fixing screw and adjust the ring for best focus.
- Set between camera and object to 0.6m and lens focus ring to 0.6m position.
- Confirm that picture is in-focus. If not, re-adjust flange-back adjusting ring for best focus.
- Repeat above procedure until the focus tracks throughout the lens focus.
- Tighten the fixing screw. (Fig. 5-1)



(5) Vsub adjustment

Adjust :	**VR1 (Vsub)**	**Drive board**
Observe :	**Video monitor**	

- Turn VR1 (Vsub) fully clockwise.
- Turn VR5 (ALC LEVEL) on the switch board fully clockwise and the lens iris to fully open position.
- Aim the camera at the bright object such as 40-watts lamp placed in front of the dark back ground. (Fig. 5-2)

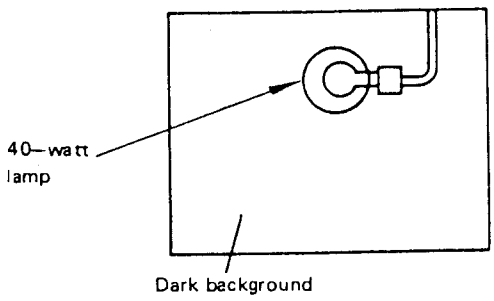


Fig. 5-2

- While observing video monitor, adjust VR1 (Vsub) on the Drive board so that the smear on the video monitor just disappear. (Fig. 5-3)

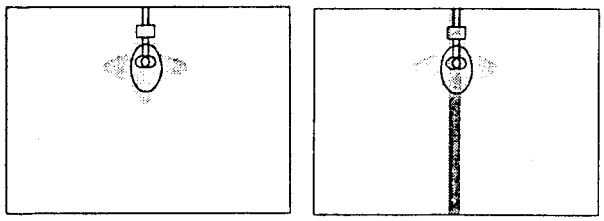


Fig. 5-3

- Set the Camera Mode Selection Switch to SHTR position and Shutter Speed Selection Switch to 1/1000 position. They are on the Switch board.
- Confirm the noise isn't on the video monitor as the blooming or the smear.
- If the noise are on the monitor, adjust VR1 so that the noise just disappear.
- Set the Camera Mode Selection Switch to NOR position.

(6) ALC 1 adjustment

Test point :	**TP7 (ALC1)**	**Process board**
Adjust :	**VR3 (ALC LEVEL)**	**Switch board**

- Connect the digital voltmeter to TP7 (ALC).
- Adjust VR3 (ALC LEVEL) for 2.50V ± 0.02V.

(7) ALC2 adjustment

Test pint :	**TP1 (ALC 2)**	**Process board**
Adjust :	**VR5 (ALC 2)**	**Process board**

- Aim the camera at logarithmic gray scale chart.
- Connect the oscilloscope to TP1 on the Processboard.
- Set the oscilloscope at H rate.
- Adjust VR5 (ALC 2) so that the signal level at TP 1 becomes 250mV ± 10mV. (Fig.5-4)

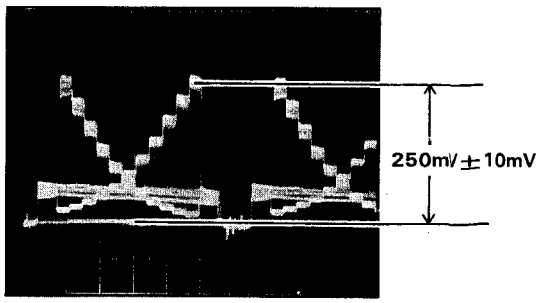


Fig. 5-4

(8) OB MOD adjustment

Test point :	**TP2 (PREVIDEO)**	**Processboard**
Adjust :	**VR1 (OB MOD)**	**Processboard**

- Cap on the lens.
- Connect the oscilloscope to TP2 (PREVIDEO) on the Process board.
- Set the oscilloscope at H rate.
- Adjust VR1 (OB MOD) on the Process board so that the pedestal level is 0 ± 5mV. (Fig. 5-5)

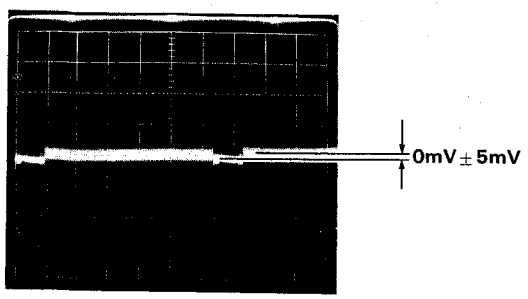


Fig. 5-5

(9) Gain adjustment

Test point :	**TP2 (PREVIDEO)**	**Process board**
Adjusts :	**VR3 (AGC SET)**	**Process board**
	VR2 (GAIN SET)	**Process board**

- Aim the camera at logarithmic gray scale chart.
- Connect the oscilloscope to TP2 (PREVIDEO) on the Process board.
- Set the oscilloscope at H rate.
- Set the AGC ON/OFF switch to ON position.
- Adjust VR3 (AGC SET) so that the signal level becomes 800mV ± 20mV. (Fig. 5-6)
- Set the AGC ON/OFF switch to OFF position.
- Adjust VR2 (GAIN SET) so that the signal level becomes 800V ± 20V. (Fig. 5-6)
- Reset the AGC ON/OFF switch to ON position.

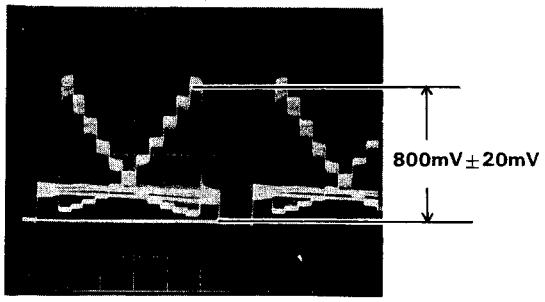


Fig. 5-6

(10) Pedestal level adjustment

Test point :	**VIDEO OUT connector**	
Adjust :	**VR7 (PEDESTAL LEVEL)**	**Process board**

- Cap on the lens.
- Connect the 75 ohms terminated oscilloscope to VIDEO OUT Connector.
- Set the oscilloscope at H rate.
- Adjust VR7 (PEDESTAL LEVEL) so that the level between center of video signal and pedestal level becomes 50mV ± 10mV. (Fig. 5-7)
- Confirm that signal level is not changed when AGC ON/OFF switch is switched to ON and OFF. If not, readjust VR1, VR3 and VR2 on the Process board referring to (8) OB MOD adjustment and (9) Gain adjustment.

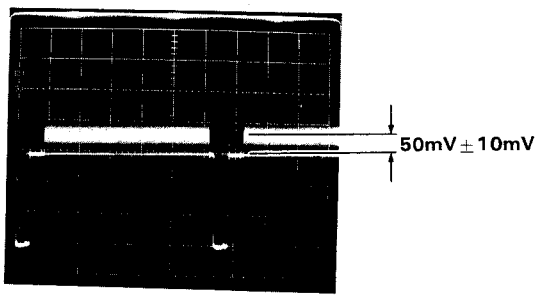


Fig. 5-7

(11) EXT VCO adjustment

Test point :	**TP4 (SYNC VCO)**	**Process board**
Adjust :	**L10 (EXT SYNC ADJ)**	**Process board**

- Set the Gen-lock Termination Switch to ON (75 ohms) position.
- Supply Vs signal to GEN-LOCK connector of camera from sync signal generator.
- Connect the digital voltmeter to TP4 (SYNC VCO) on the Process board.
- Confirm that Sync Selection Switch is set to INT position for WV-BL600 and WV-BL604.
- Adjust L10 (EXT SYNC ADJ) for 2.5V ± 0.1V.

(12) H phase adjustment

Test points :	**VIDEO OUT connector**	
	TP3 (GEN-LOCK)	**Process board**
Adjust :	**VR1 (H PHASE)**	**Switch board**

- Cap on the lens.
- Set the Gen-lock Termination Switch to ON position.
- Supply Vs signal to GEN-LOCK connector of camera from sync signal generator.
- Connect 75 ohms terminated channel 1 prove of oscilloscope to VIDEO OUT connector of camera and channel 2 probe to TP3 (GEN-LOCK) on the Process board.
- Set the oscilloscope triggered by TP3 (GEN-LOCK) on the Process board at H rate.

- Expand H blanking period of oscilloscope using delayed sweep mode of oscilloscope.
- Adjust VR1 (H PHASE) so that both sync signal are coincided. (Fig. 5-8)

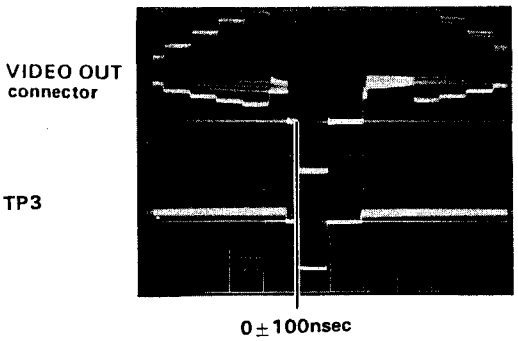


Fig. 5-8

(13) Line-lock phase adjustment (For WV-BL600 and WV-BL604)

Test points :	**VIDEO OUT connector**	
	AC Input terminal	**Switch board**
Adjust :	**VR2 (V PHASE)**	**Mother board**

- Cap on the lens.
- Disconnect the composite video or sync signal from the GEN-LOCK connector.
- Set the Sync Selection Switch to LL position.
- Connect the channel 1 probe of oscilloscope to VIDEO OUT connector of camera, terminated with 75 ohms.
- Connect channel 2 probe of oscilloscope to live side of AC power source.
- Set the oscilloscope triggered by channel 2 to V rate.
- Adjust VR2 (V PHASE) so that decay point of V sync signal delays 2H ± 1H from zero cross point of AC power source. (Fig. 5-9)

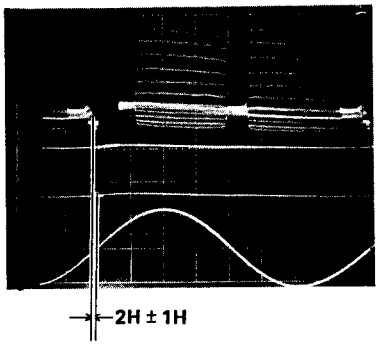


Fig. 5-9

(14) 19MHz VCO adjustment

Test points :	**TP1 (19MHz VCO)**	**Memory board**
Adjust :	**L5 (19MHz VCO ADJ)**	**Memory board**

- Set the Electronic Zoom ON/OFF Switch to ON position.
- Connect the digital voltmeter to TP1 (19MHz VCO).
- Adjust L5 (19MHz VCO ADJ) for 2.5V ± 0.1V.
- Set the Electronic Zoom ON/OFF Switch to OFF position.

(15) AGC DET CLAMP adjustment

Test points :	**TP3 (AGC DET OUT)**	**Interface board**
Adjust :	**VR2 (AGC DET CLAMP)**	**Interface board**

- Set Camera Mode Selection Switch to SENS UP position.
- Cap on the lens.
- Connect the oscilloscope to TP3 (AGC DET OUT) on the Interface board.
- Set the oscilloscope at H rate.
- Adjust VR2 (AGC DET CLAMP) on the Interface board so that the DC level of TP7 Becomes 1.8V ± 0.1V.(Fig. 5-10)

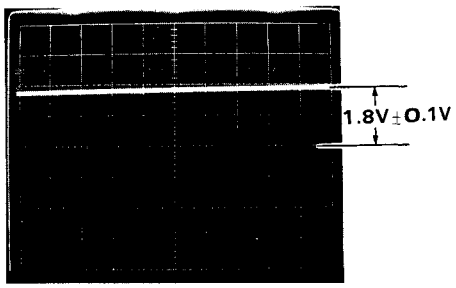


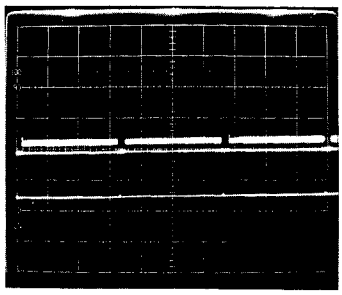
Fig. 5-10

(16) SENS UP CLAMP adjustment

Test points :	**VIDEO OUT connector**
Adjust :	**VR6 (SENS UP CLAMP) Process board**

- Set Camera Mode Selection Switch to SENS UP position.
- Cap on the lens.
- Connect the oscilloscope to VIDEO OUT connector of camera, terminated with 75 ohms.
- Set the oscilloscope at V rate.

- Adjust VR6 (SENS UP CLAMP) on the process board so that rise point sag of V sync signal is disappeared.



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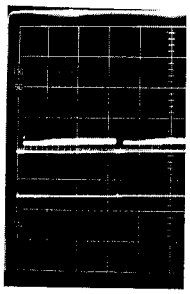

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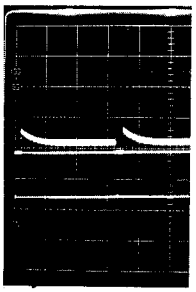
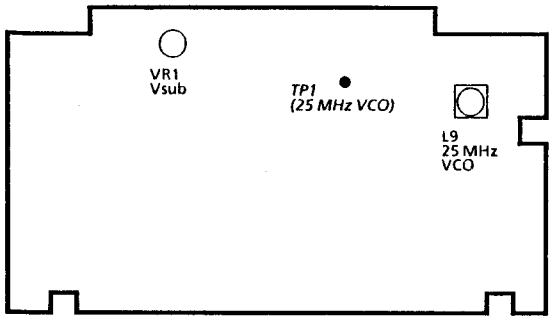


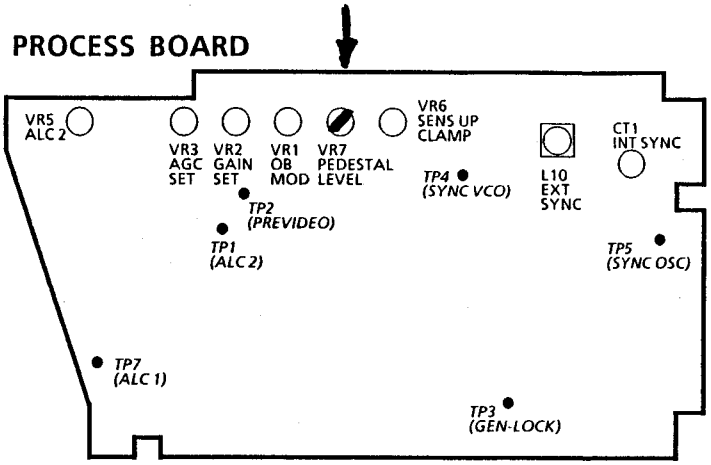
NO GOOD

LOCATION OF TEST POINTS AND ADJUSTING CONTROLS

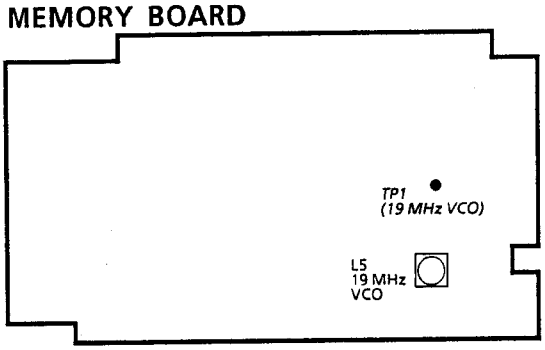
DRIVE BOARD



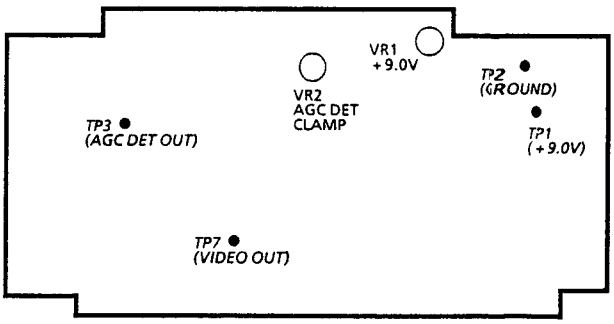
PROCESS BOARD



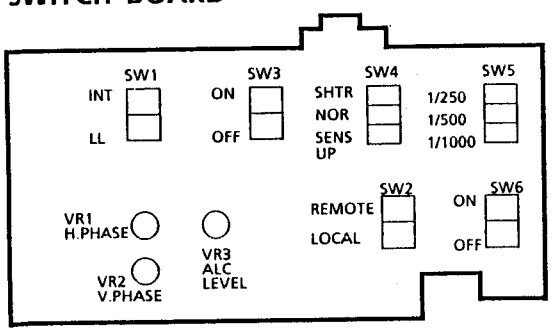
MEMORY BOARD



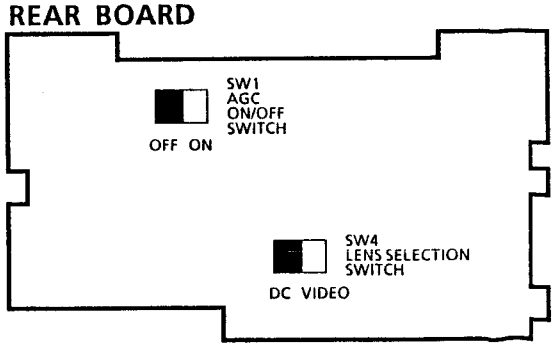
INTERFACE BOARD



SWITCH BOARD



REAR BOARD



SW1: SYNC SELECTION SWITCH
(FOR WV-BL600 AND WV-BL604)
SW2: CONTROL MODE SELECTION SWITCH
SW3: GEN LOCK TERMINATION SWITCH
SW4: CAMERA MODE SELECTION SWITCH
SW5: SHUTTER SPEED SELECTION SWITCH
SW6: ELECTRONIC ZOOM ON/OFF SWITCH

APPENDIX OF IC, TRANSISTOR AND DIODE

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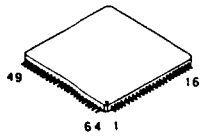

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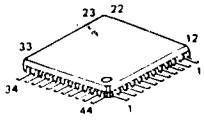

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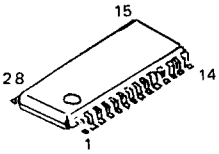

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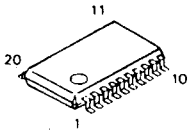

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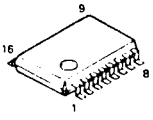

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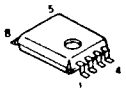

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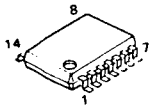

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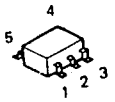

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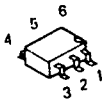

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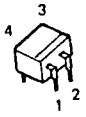

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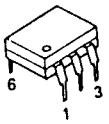

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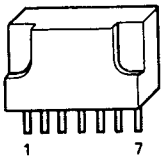

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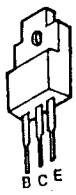

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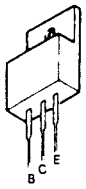

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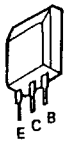

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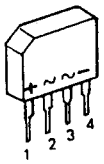

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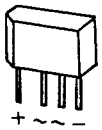

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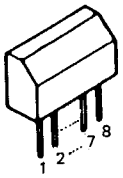

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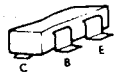

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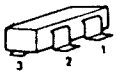

1 : Drain
2 : Source
3 : Gate

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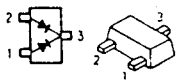
2SD874-RS

MA3200-M
MA141WK



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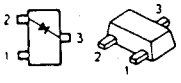

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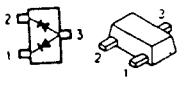

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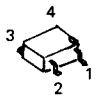

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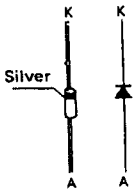

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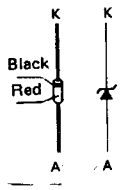
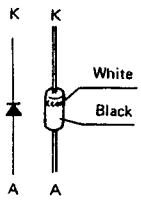
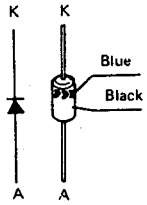


ERB44-02



ERB84-009



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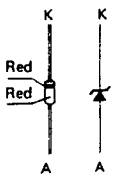
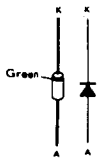
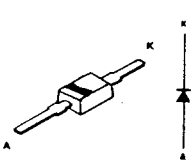


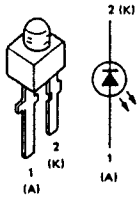
ERA22-06



1SV153



LN238RPH



CHIP COMPONENTS

1. Chip Transistor

The transistor number is indicated on the top surface of the chip transistor using two alphabet letters or one numerical and two alphabet letters.

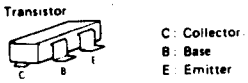
Transistor Number

Letter	Transistor No.	Letter	Transistor No.
A	2SB709	X	2SD602A
B	2SB709A	Y	2SD601
C	2SB710	Z	2SD601A
D	2SB710A	1Z	2SD1030
E	2SA1022	1N	2SK199
F	2SA1034	1O	2SK198
H	2SA1035	1A	2SB799
I	2SB792	1B	2SB814
K	2SC2778	1C	2SB902
P	2SD814	1F	2SK321
Q	2SD813	1L	2SK247
R	2SC2480	1K	2SK316
S	2SC2405	1M	2SJ84
T	2SC2406	1T	2SC3077
U	2SC2404	1X	2SC2845
V	2SC2295	2B	2SK374
W	2SD602	2C	2SK116

Example

WQ ⟶ 2SD602 – Q
YQ ⟶ 2SD601 – Q
1BS ⟶ 2SB814 – S

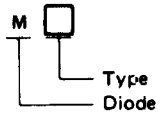
Appearance and Symbols



	1	2	3
Except 2SK199	Drain	Source	Gate
2SK199	Gate	Drain	Source

2. Chip Diode

The diode number is indicated on the top surface of the chip diode using Two alphabet letters.



Diode Number

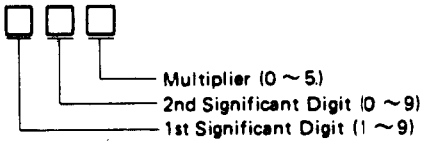
Letter	Diode No.	Letter	Diode No.
MA	MA151A	MI	MA152K
MB	MA152A	MK	MA28W-B
MC	MA153	ML	MA28T-A
MD	MA28-A	MN	MA151WA
ME	MA28-B	MO	MA152WA
MF	MA28W-A	MT	MA151WK
MH	MA151K	MU	MA152WK

Appearance and Symbols

	1	2	3
MA28/28W/28T	–	Anode	Cathode
MA151K/152K	–	Anode	Cathode
MA151A/152A	–	Cathode	Anode
MA151WK/MA152WK	Anode	Anode	Cathode
MA151WA/MA152WA	Cathode	Cathode	Anode
MA153	Cathode	Anode	Common

3. Chip Resistor

The resistor value is indicated on the bottom surface of the chip resistor using three digit numbers.



EXAMPLE:

330 ⟶ 33×10^0 = 33 ohms
561 ⟶ 56×10^1 = 560 ohms
123 ⟶ 12×10^3 = 12 kohms

Note: Zero ohm resistor (jumper chip) is colored red or green.

4. Chip Capacitor

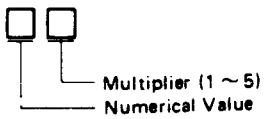
The capacitive value of replacement chip capacitors is indicated on the bottom surface. Original parts do not have value indication.

If the capacitive value is less than 100 pF, the value will be indicated by one or two digit number expressing the capacity directly in pF.

EXAMPLE:

0.5 ⟶	0.5 pF	2.5 ⟶	2.5 pF
75 ⟶	0.75 pF	33 ⟶	33 pF
1 ⟶	1 pF	82 ⟶	82 pF

If the capacitive value is 100 pF or greater, the value will be indicated by an alpha-numeric code. The letter precedes the number and expresses a numerical value to be multiplied by the number which follows.



Numerical Value

Letter	Value	Letter	Value
A	10	N	33
B	11	P	36
C	12	Q	39
D	13	R	43
E	15	S	47
F	16	T	51
G	18	U	56
H	20	V	62
J	22	W	68
K	24	X	75
L	27	Y	82
M	30	Z	91

* Letters I and O are not used

EXAMPLE:

A1 ⟶ $10 \times 10^1 = 100$ pF

N2 ⟶ $33 \times 10^2 = 3300$ pF

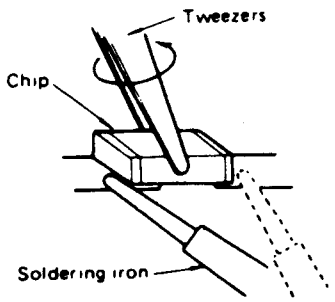
S3 ⟶ $47 \times 10^3 = 47000$ pF

5. Precautions in replacing the chip component

1. Make sure that the unit is turned OFF when replacing the chip.
2. Use tweezers to prevent any damage to the chip surface.
3. Do not re-use the chips after removal.
4. Do not rub the electrode of chips.
5. Do not subject the chips to excessive stress.
6. It is recommended that a pencil-type soldering iron to be used.
7. The solder whose diameter is less than 0.5 mm is recommended.
8. Do not heat the chip beyond 3 seconds.
9. Maintain temperature control under 260°C (500°F) when soldering.

5-1 Removal (Transistor, Diode, Resistor and Capacitor)

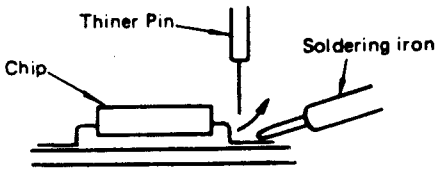
1. Add the solder to both ends of the chip (three leads for chip transistor).
2. While attaching the soldering iron to both ends of the chip (three leads for chip transistor) as shown below, remove the chip by turning it with tweezers.
   Note Be careful not to damage other chips.



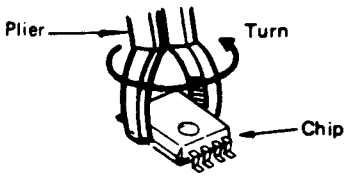
5-2 Removal (IC)

1. Add the solder wick and solder iron to each lead of the IC and remove solder.

2. Add the solder iron to each lead of the IC and left each lead of the IC using thiner pin.

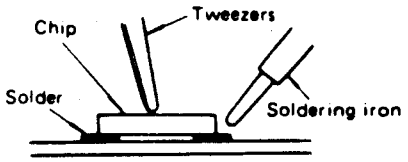


3. Remove IC turning it with plier.

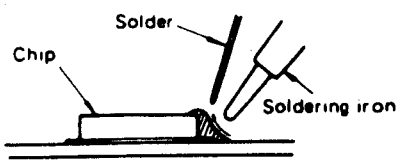


5-3 Mounting

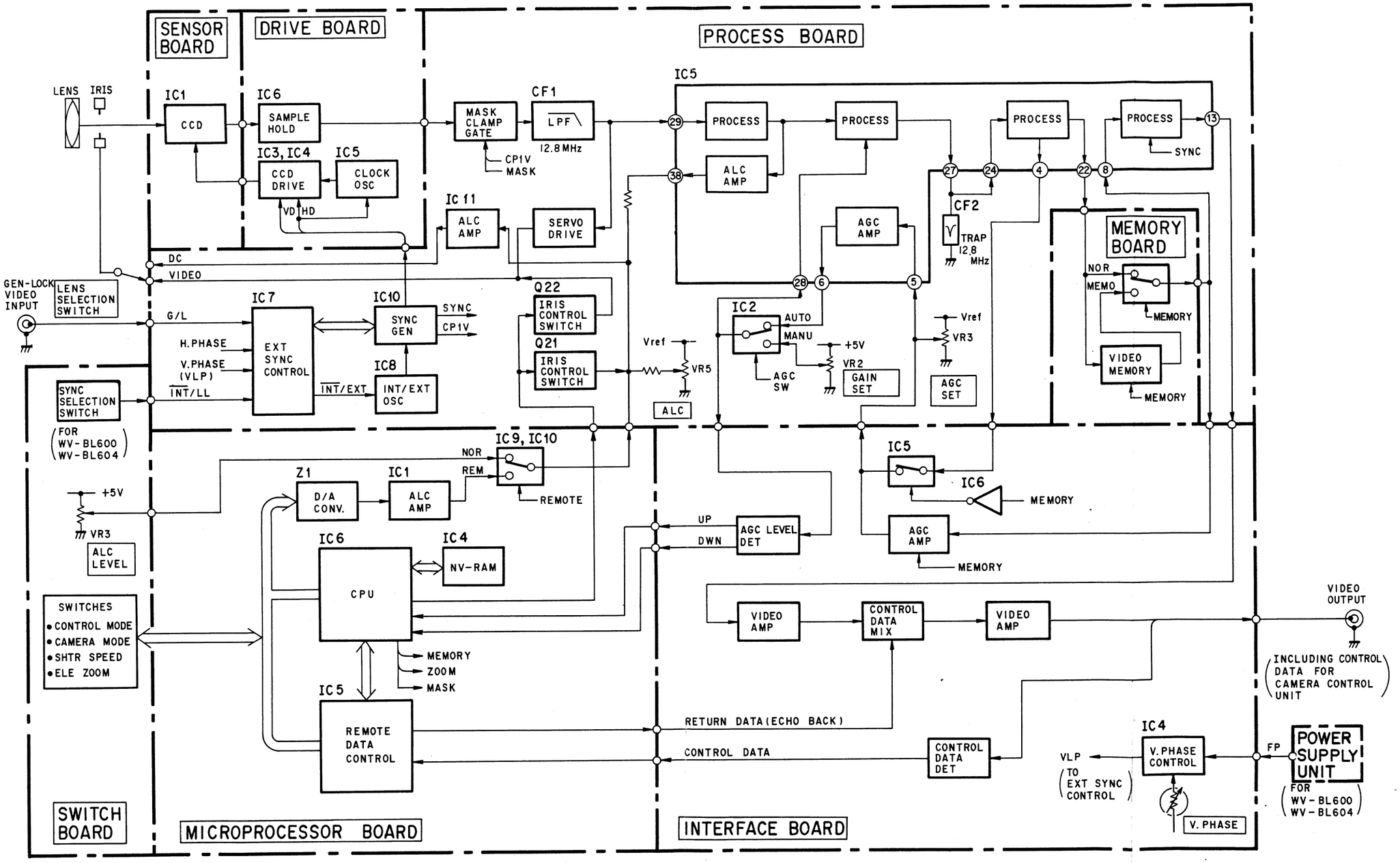
1. Place the solder thinly on the chip mounting foil.
2. Solder the chip temporarily while holding the chip with the tweezers.



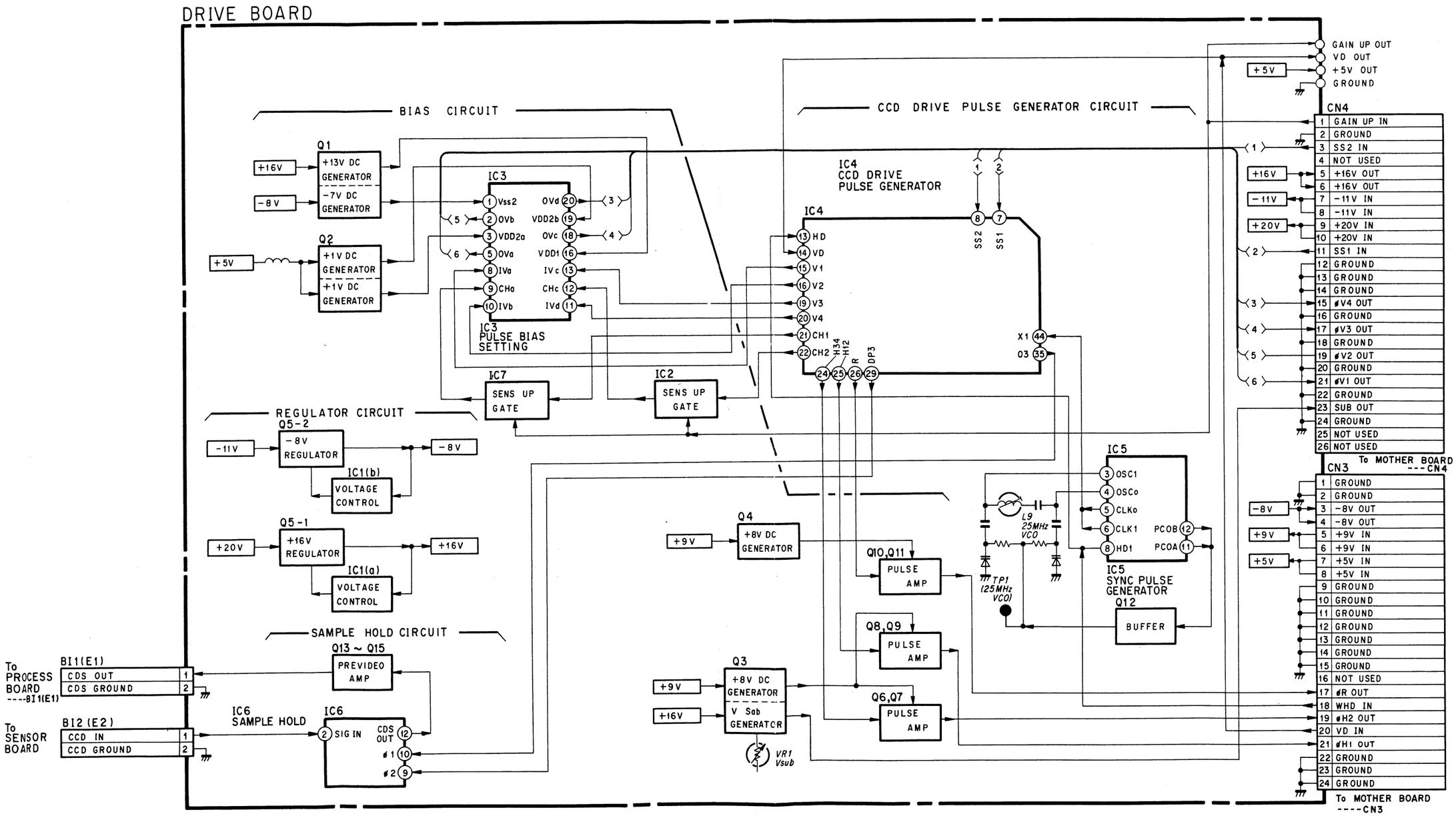
3. Solder both ends of chip (three leads for chip transistor).



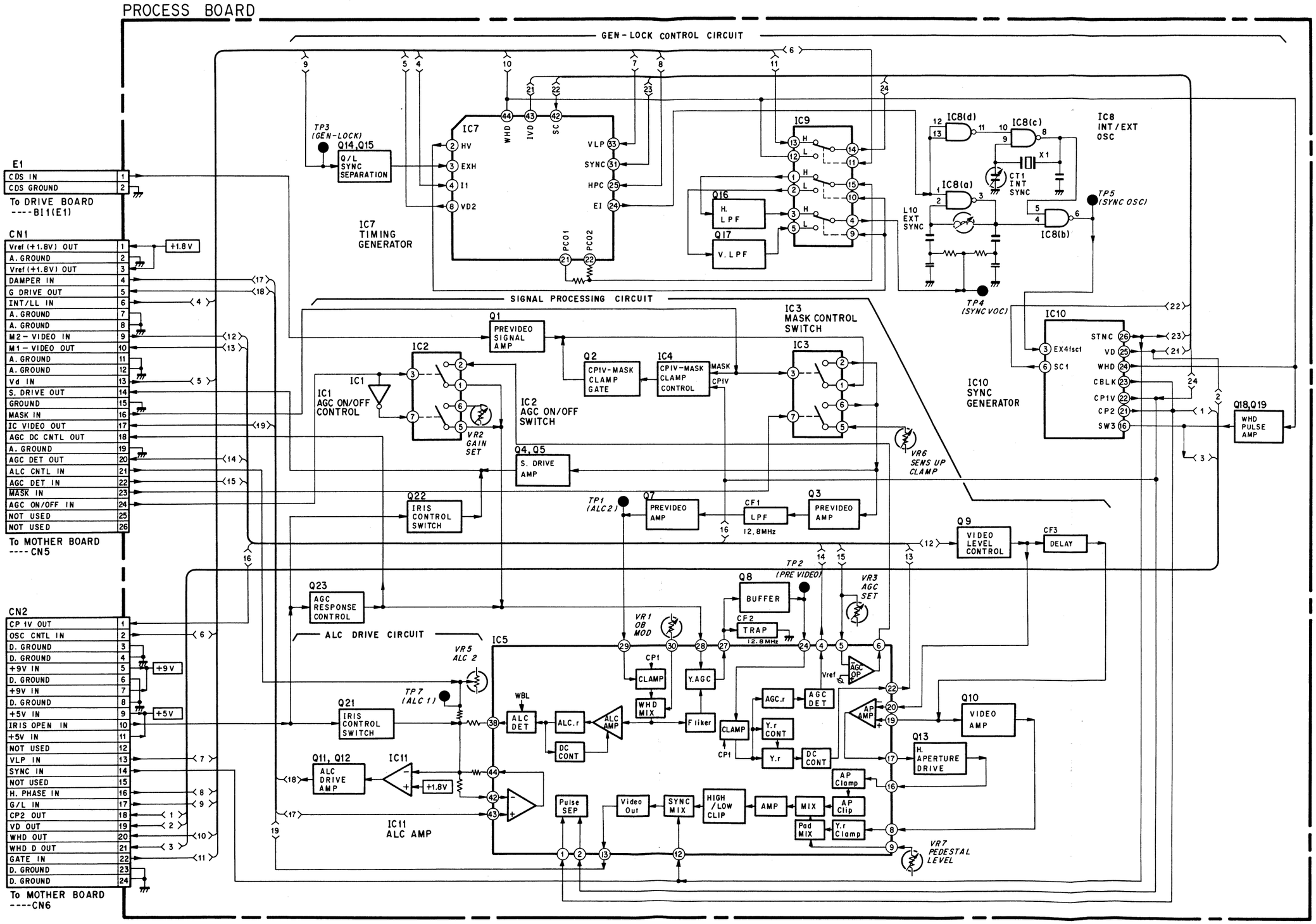
BLOCK DIAGRAM OF WV-BL600 SERIES



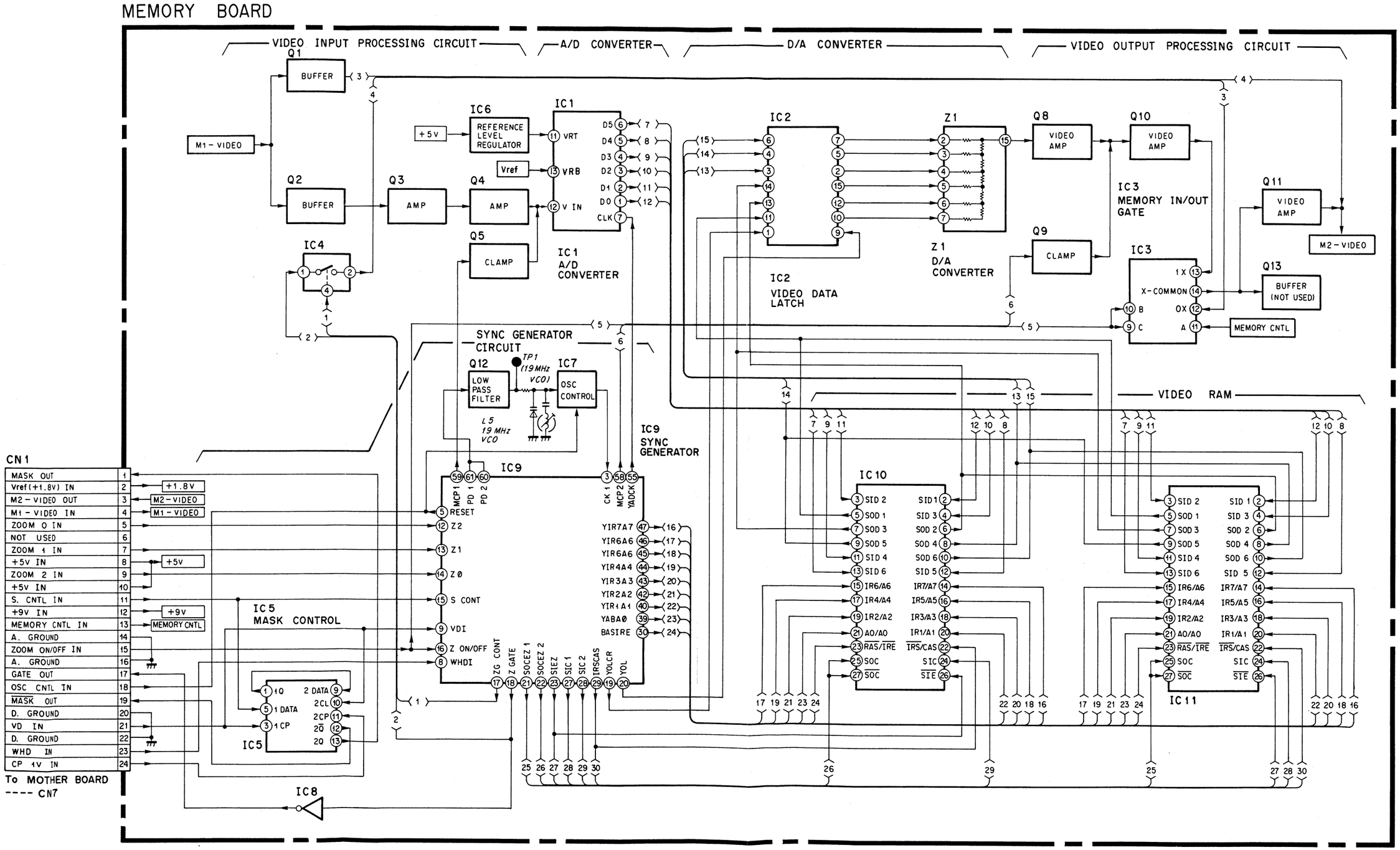
BLOCK DIAGRAM OF DRIVE BOARD



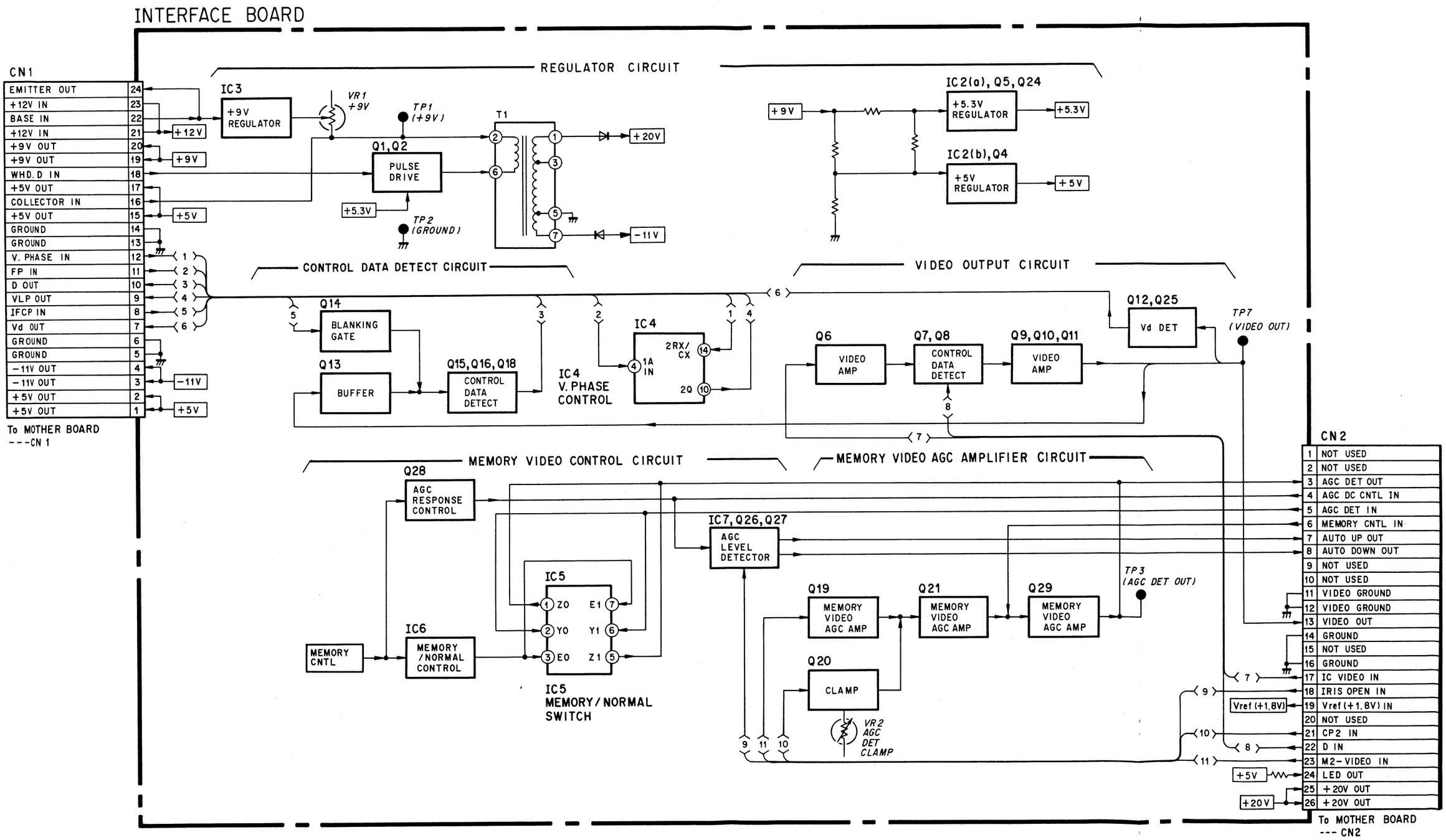
BLOCK DIAGRAM OF PROCESS BOARD



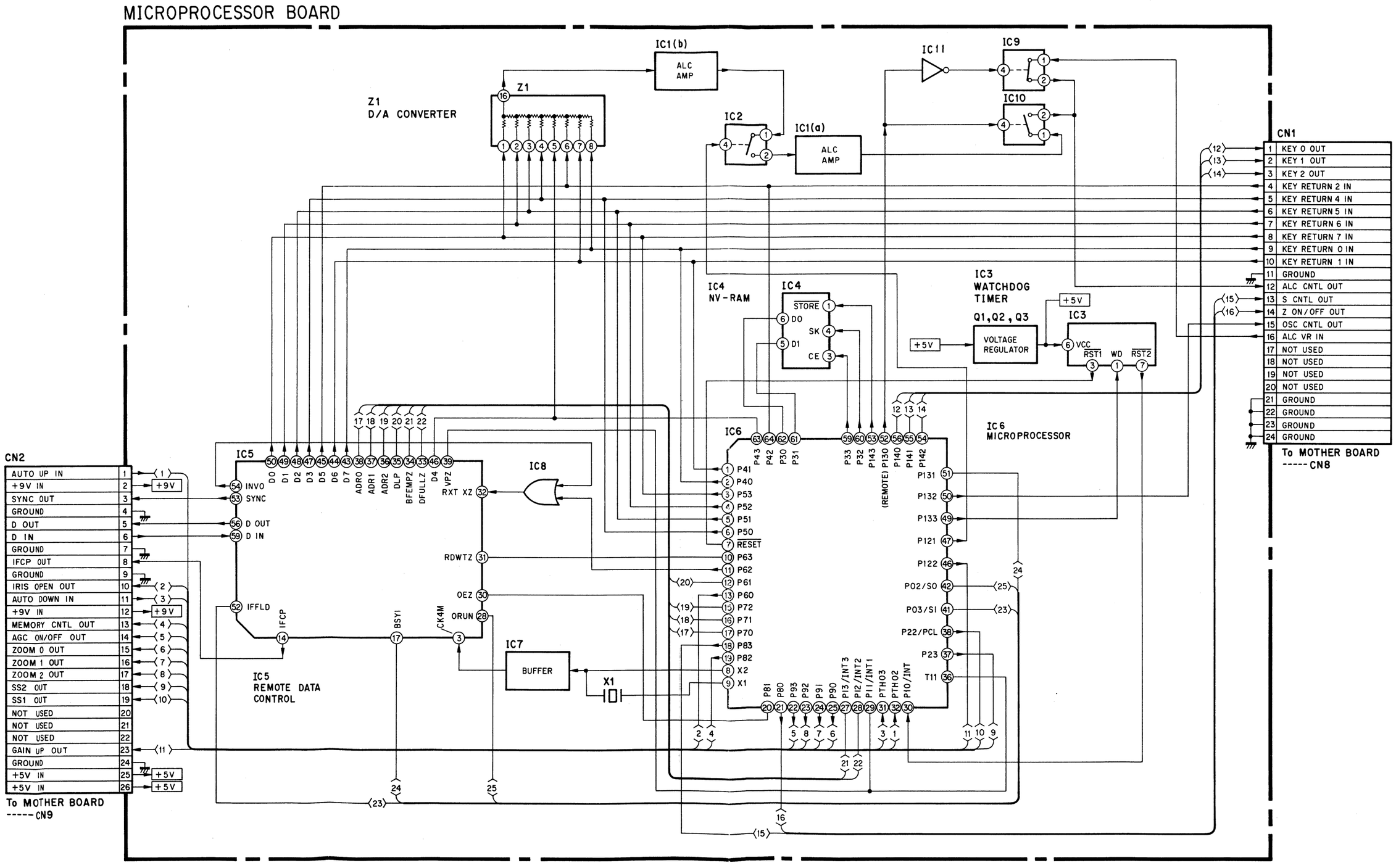
BLOCK DIAGRAM OF MEMORY BOARD



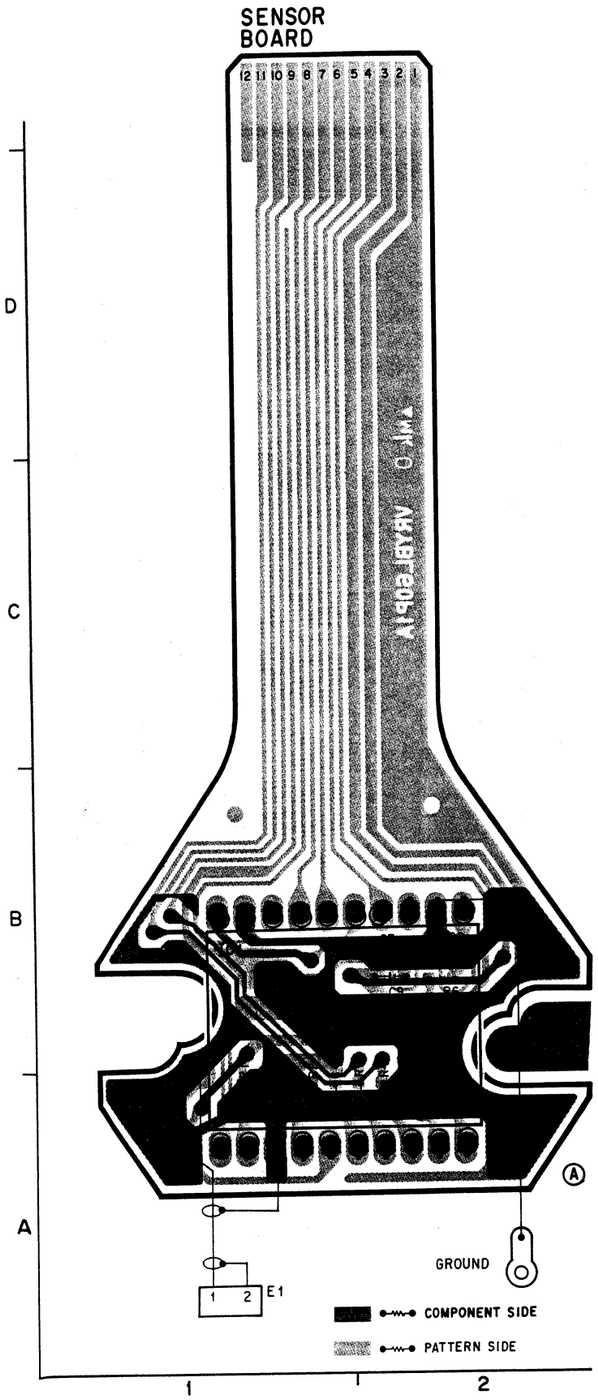
BLOCK DIAGRAM OF INTERFACE BOARD



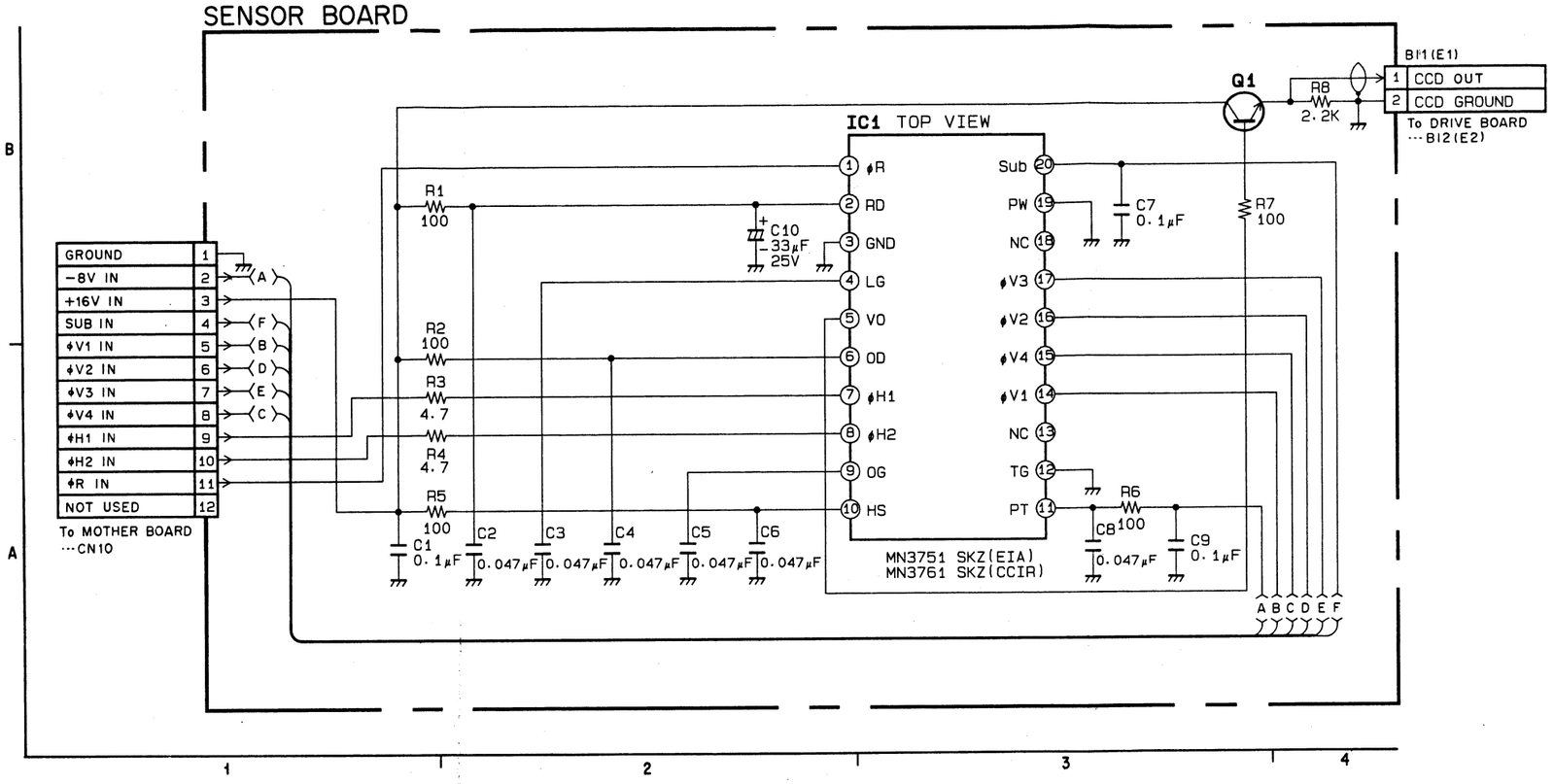
BLOCK DIAGRAM OF MICRO PROCESSOR BOARD



CONDUCTOR VIEW OF SENSOR BOARD



SCHEMATIC DIAGRAM OF SENSOR BOARD

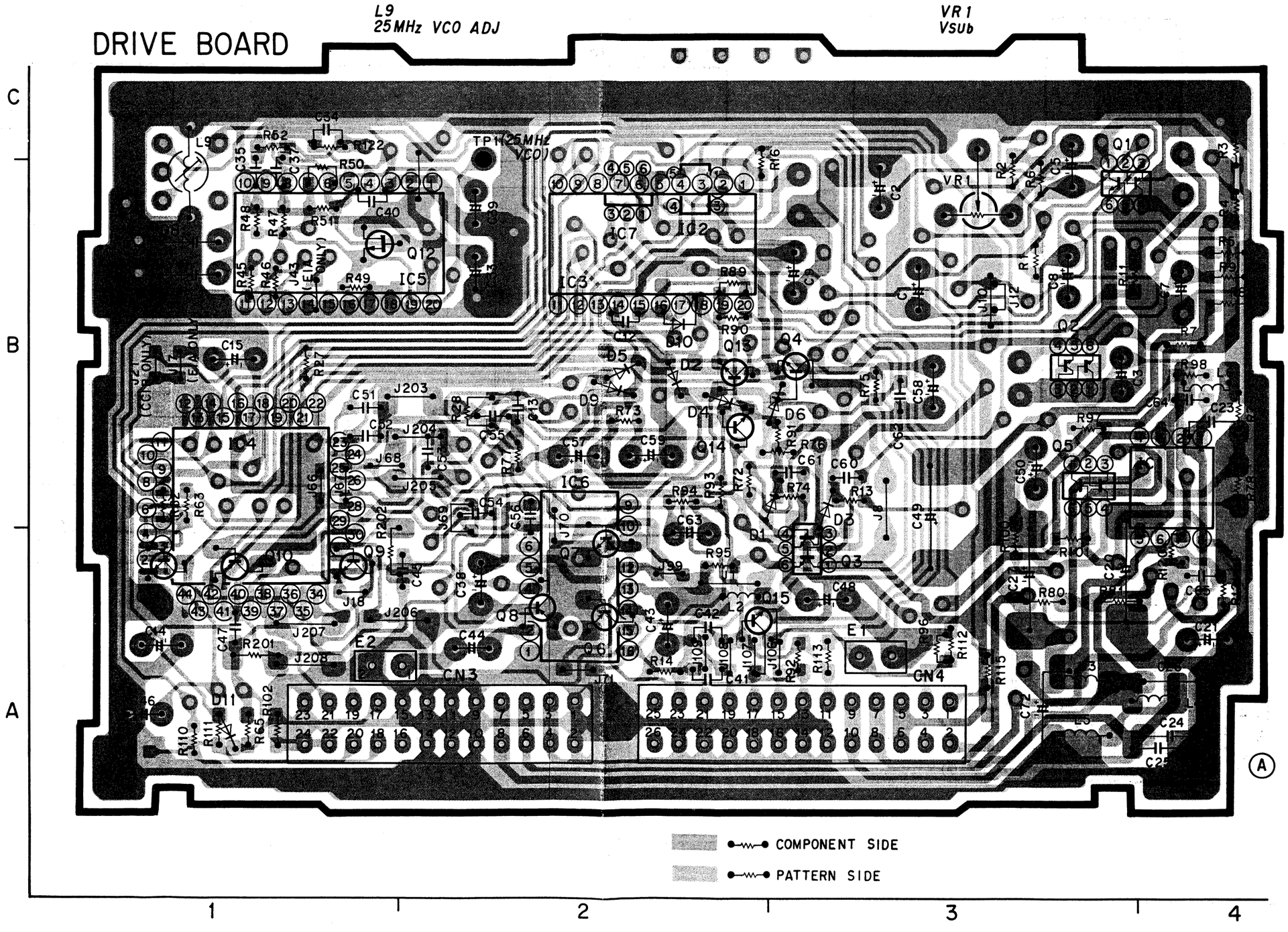


CONDUCTOR VIEW OF DRIVE BOARD

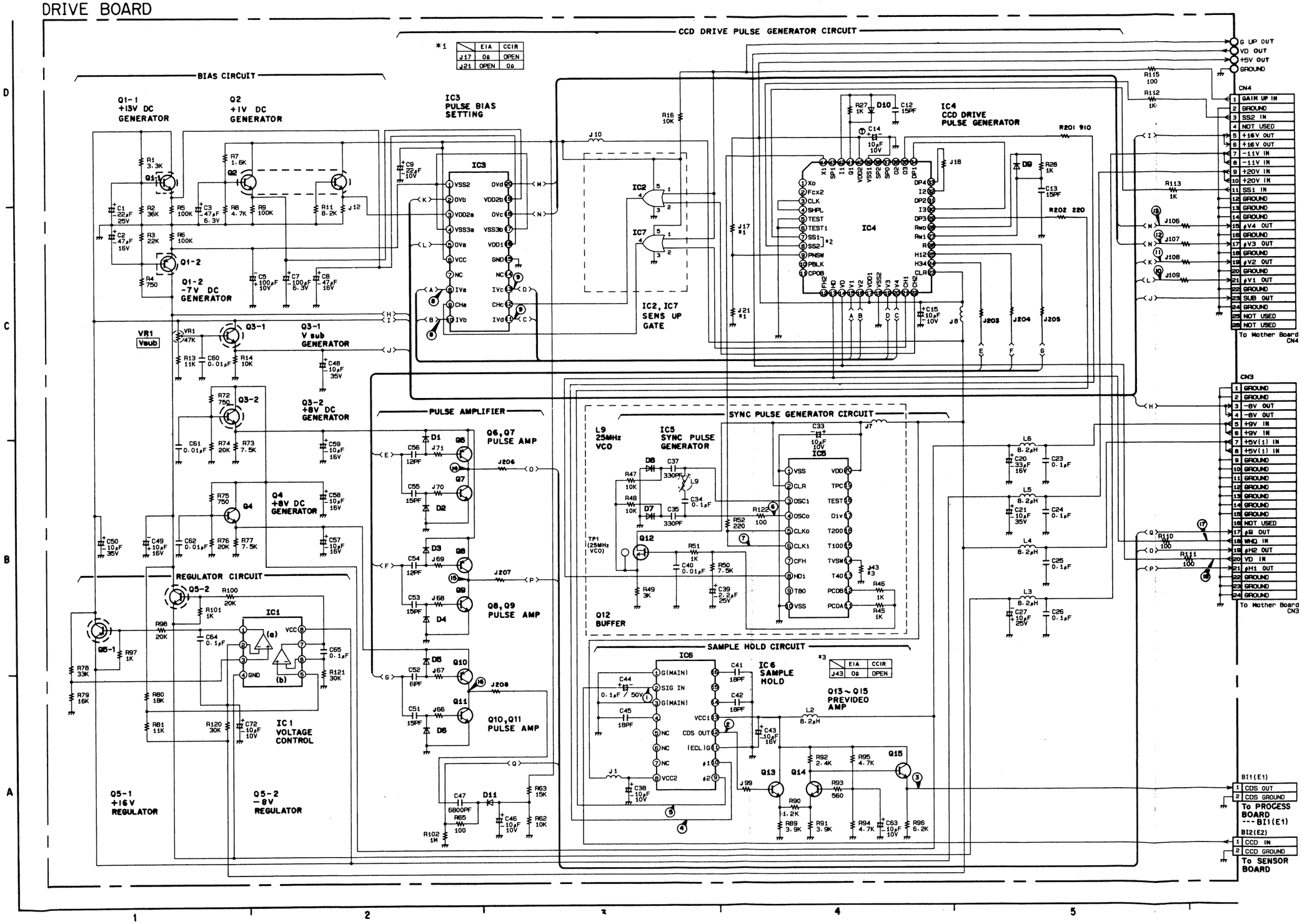
<ADDRESS INFORMATION>

DRIVE

REF No.	Address
IC1	B4
IC2	B2
IC3	B2
IC4	B1
IC5	B1
IC6	A2
IC7	B2
Q1	B3
Q2	B3
Q3	A3
Q4	B3
Q5	B3
Q6	A2
Q7	A2
Q8	A2
Q9	A1
Q10	A1
Q11	A1
Q12	B1
Q13	B2
Q14	B2
Q15	A2
D1	B3
D2	B2
D3	B3
D4	B2
D5	B2
D6	B3
D7	B1
D8	B1
D9	B2
D10	B2
D11	A1

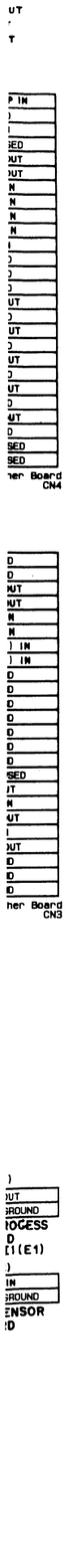


SCHEMATIC DIAGRAM OF DRIVE BOARD



<ADDRES

REF No.
IC1
IC2
IC3
IC4
IC5
IC6
IC7
Q1
Q2
Q3
Q4
Q5
Q6
Q7
Q8
Q9
Q10
Q11
Q12
Q13
Q14
Q15
D1
D2
D3
D4
D5
D6
D7
D8
D9
D10
D11



<ADDRESS INFORMATION>

REF No.	Address
IC1	B2
IC2	D3
IC3	C2
IC4	C4
IC5	B4
IC6	A3
IC7	C3
Q1	C1, D1
Q2	D2
Q3	C1
Q4	B1
Q5	B1
Q6	B2
Q7	B2
Q8	B2
Q9	B2
Q10	A2
Q11	A2
Q12	B3
Q13	A4
Q14	A4
Q15	A4
D1	C2
D2	B2
D3	B2
D4	B2
D5	B2
D6	A2
D7	B3
D8	B3
D9	D5
D10	D4
D11	A3

<VOLTAGES>

	IC1	IC2	IC3	IC5	IC6	IC7
Pin 1	7.7	0.1	-7.1	0	0	0.1
2	4.9	4.9	2.6	4.9	6.8	4.9
3	4.9	0	0	2.6	0	0
4	-12.0	4.9	-7.1	2.6	5.7	4.9
5	0	4.9	-0.3	-	0	4.9
6	0		4.9	-	0	
7	1.1		0	2.4	0	
8	-		0.2	0.7	4.9	
9			4.9	4.9	1.2	
10			0.2	0	1.3	
11			4.6	2.1	0	
12			4.9	2.1	4.7	
13			4.6	4.9	8.9	
14			0	0	5.5	
15			0	4.9	0	
16			13.0	4.9	5.8	
17			-7.1	4.9		
18			-6.7	4.9		
19			3.0	4.9		
20			-6.5	4.9		

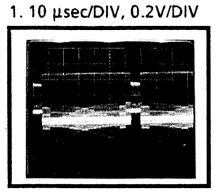
	IC4		IC4
Pin 1	2.5	Pin23	0
2	0	24	2.3
3	0	25	1.7
4	0	26	9.0
5	0	27	1.2
6	0	28	-
7	0	29	-
8	0	30	-
9	4.9	31	-
10	1.0	32	-
11	0.1	33	-
12	2.4	34	-
13	0.7	35	-
14	0.2	36	-
15	0.2	37	0
16	0.2	38	0
17	4.9	39	0
18	0	40	4.9
19	4.6	41	-
20	0	42	1.2
21	4.9	43	-
22	4.9	44	2.7

	Q 1	Q 2	Q 3	Q 5
Pin 1	15.0	4.9	15.0	-8.0
2	-7.7	3.6	8.7	-
3	-7.0	4.9	8.9	-
4	-8.0	-0.2	8.5	14.9
5	13.7	0	7.8	-11.4
6	13.1	3.0	8.1	-12.0

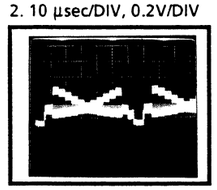
	B	C	E
Q4	8.6	8.9	7.9
Q6	7.7	-	7.8
Q7	0.1	-	0
Q8	7.6	-	7.8
Q9	0	-	0
Q10	7.9	-	7.9
Q11	0.3	-	0
Q13	4.7	8.9	0
Q14	4.4	7.2	3.7
Q15	7.2	8.9	6.5

	G	D	S
Q 12	2.1	-	2.5

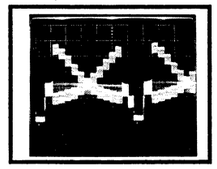
1. 10 µsec/DIV, 0.2V/DIV



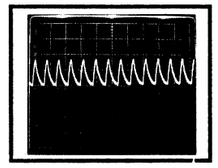
2. 10 µsec/DIV, 0.2V/DIV



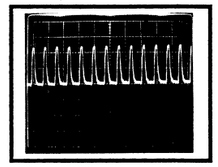
3. 10 µsec/DIV, 2V/DIV



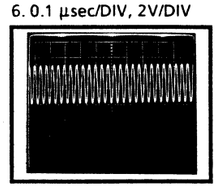
4. 0.1 µsec /DIV,2V/DIV



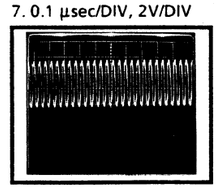
5. 0.1 µsec/DIV, 2V/DIV



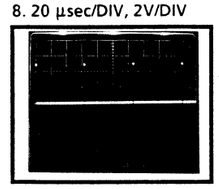
6. 0.1 µsec/DIV, 2V/DIV



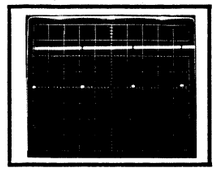
7. 0.1 µsec/DIV, 2V/DIV



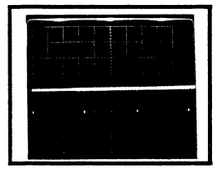
8. 20 µsec/DIV, 2V/DIV



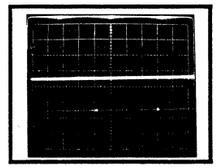
9. 20 µsec/DIV, 2V/DIV



10. 5 msec/DIV, 5V/DIV



11. 2 msec /DIV,5V/DIV



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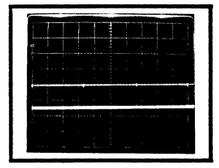
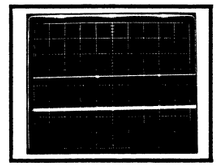
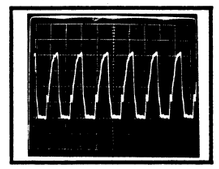


13. 2 msec/DIV, 5V/DIV



14. 50 nsec/DIV, 2V/DIV



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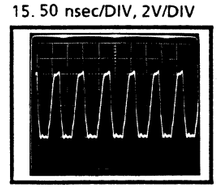

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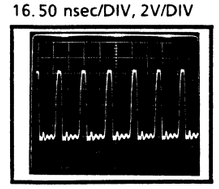
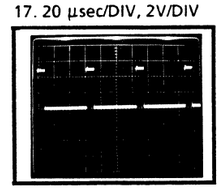
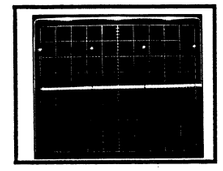


17. 20 µsec/DIV, 2V/DIV



18. 5 msec/DIV, 2V/DIV



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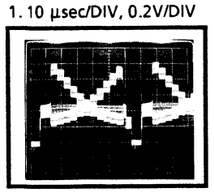

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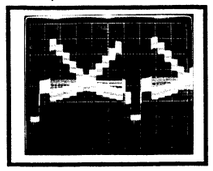

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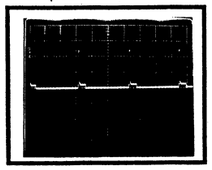

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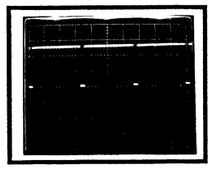

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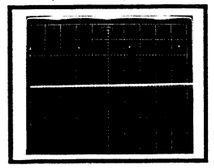

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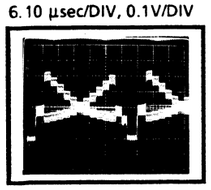

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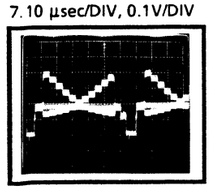
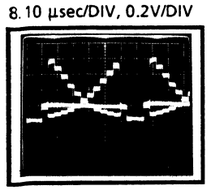
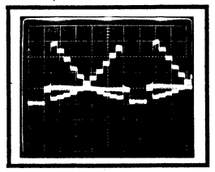


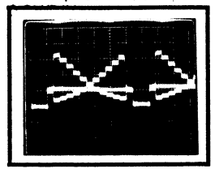
8. 10 µsec/DIV, 0.2V/DIV



9. 10 µsec/DIV, 0.2V/DIV



10. 10 µsec/DIV, 0.2V/DIV



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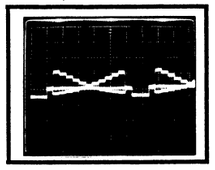

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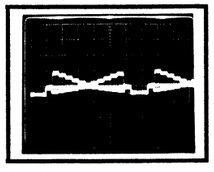

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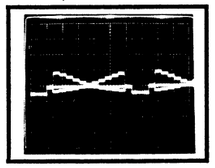

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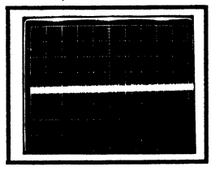

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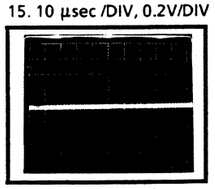

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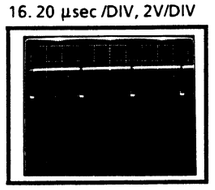
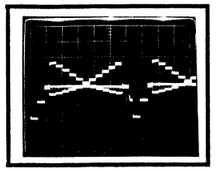


17. 10 µsec/DIV, 0.5V/DIV



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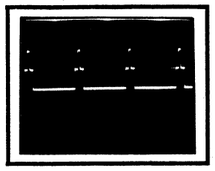

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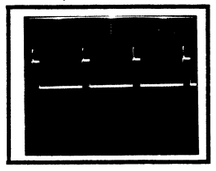
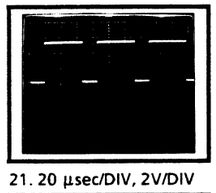


20. 5 msec/DIV, 2V/DIV



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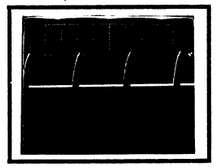
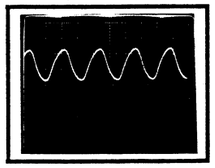


22. 0.1 µsec/DIV, 2V/DIV



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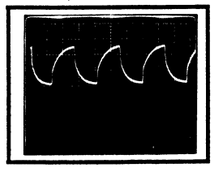

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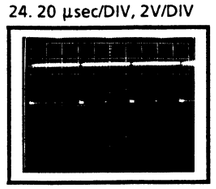

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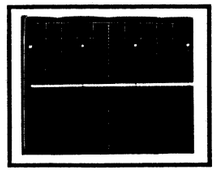

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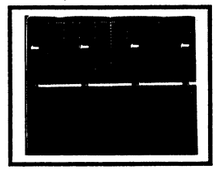

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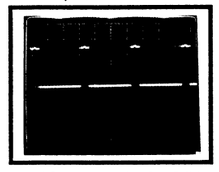

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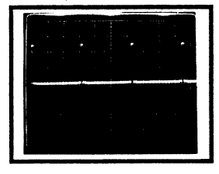

<VOLTAGES>

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Pin 1	0	4.2	1.8	0.1	0	0	5.0	1.8
2	4.8	4.2	1.8	4.6	5.0	0	0	0
3	0	4.8	4.6	0	5.0	0.6	2.2	3.3
4	0	0	0	0	5.0	0.6	0	0
5	4.9	4.2	1.8	4.9	1.9	0.6	5.0	5.0
6		2.0	1.8		2.0	0	2.3	
7		0	0.4		0	0	2.4	
8		4.9	4.9		1.9	0	4.9	
9					2.2	0	0	
10					5.0	0	5.0	
11					5.0	0	0	
12					0	0.5	5.0	
13					0	5.0	5.0	
14					5.0	0.5	2.2	
15						0	—	
16						5.0	—	
⋮							—	
28							5.0	

	IC5	IC7		IC5	IC7
Pin 1	0.7	5.0	Pin23	3.1	5.0
2	0.5	0	24	1.9	0
3	0	5.0	25	4.9	0.4
4	1.9	0	26	1.8	0
5	1.7	0	27	1.4	0
6	4.2	0	28	2.8	0
7	3.1	0	29	1.8	0
8	2.5	4.9	30	1.8	0
9	1.6	5.0	31	0.1	4.5
10	0	0	32	0.1	5.0
11	1.8	0.3	33	0.1	0
12	4.5	0	34	0.1	5.0
13	2.0	0	35	0	0
14	5.0	0	36	0	5.0
15	1.8	0	37	0.1	5.0
16	2.5	4.8	38	1.8	5.0
17	1.9	0	39	3.1	5.0
18	2.0	0	40	0.7	5.0
19	2.4	5.0	41	0.4	5.0
20	2.4	5.0	42	2.3	2.3
21	2.4	0	43	0.1	0.2
22	1.9	0	44	4.2	0.7

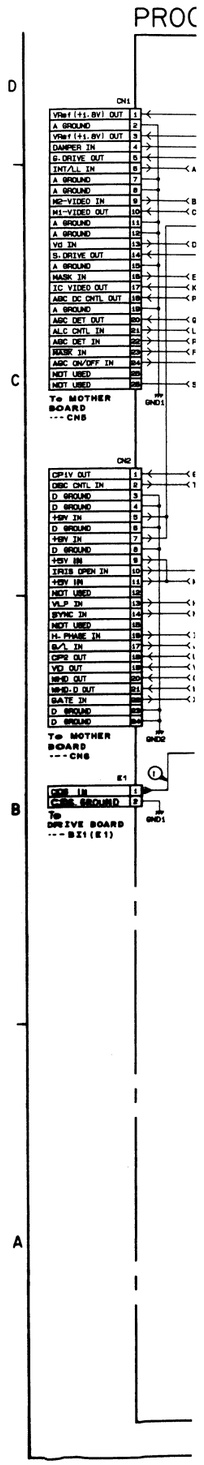
	B	C	E
Q1	6.6	9.0	5.9
Q2	0.1	1.8	1.8
Q7	1.8	4.9	1.2
Q8	1.4	0	2.0
Q9	1.9	0	2.5
Q10	2.4	4.9	1.8
Q11	0.7	5.0	0
Q12	0.1	0	0.7
Q13	1.9	0	2.5
Q14	4.4	0.1	5.0
Q15	0	5.0	0
Q16	0.6	0	5.0
Q17	0.6	0	5.0
Q18	0.8	5.0	1.2
Q19	0.8	0	1.2
Q21	0	3.3	0
Q22	0	4.0	0

	Q 4	Q 5
Pin 1	4.9	4.9
2	1.8	41.8
3	4.0	4.9
4	1.8	1.8
5	1.2	1.2
6	1.2	1.2

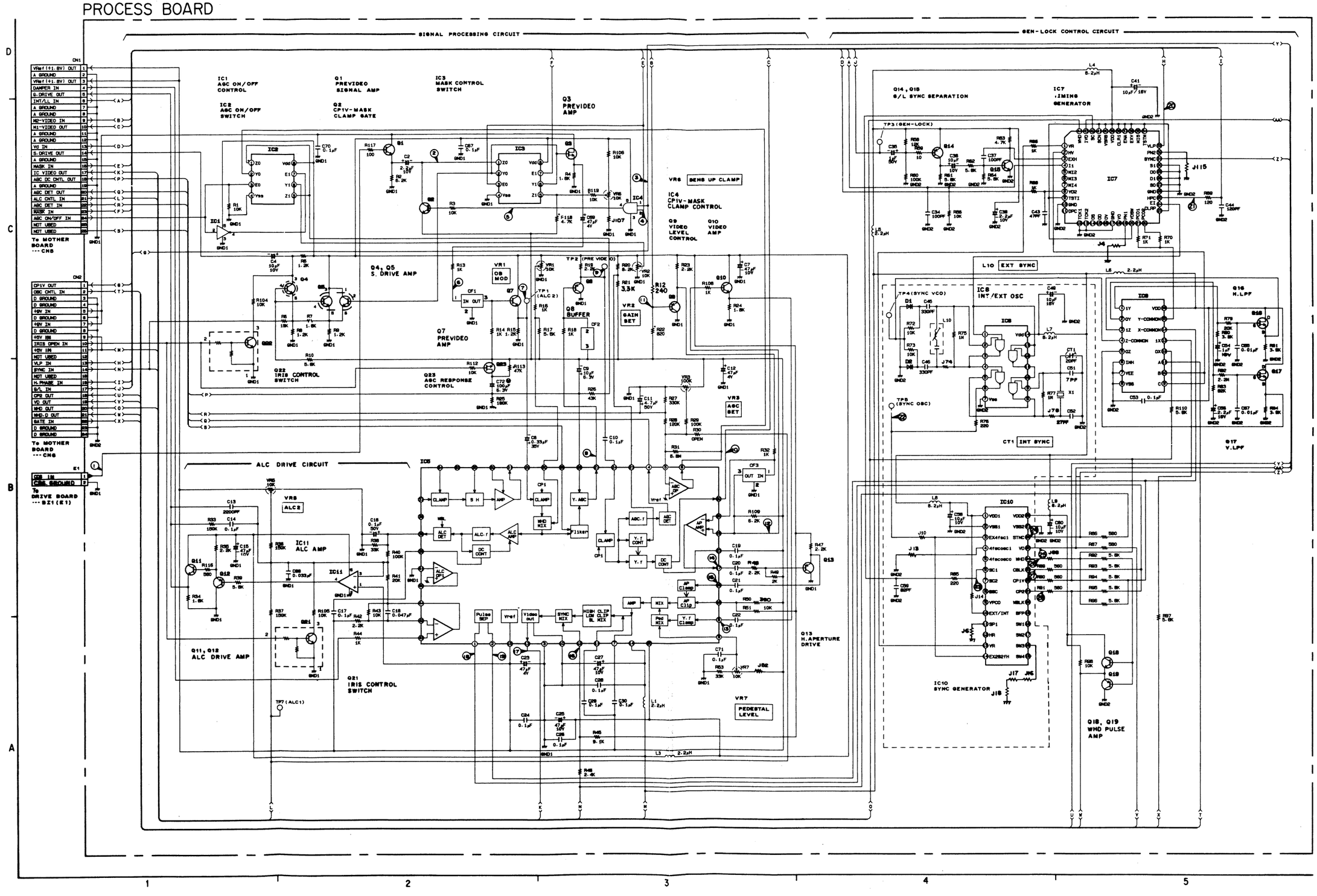
	G	D	S
Q 3	1.8	9.0	2.0
Q 23	0	1.8	1.8

<ADDRESS INFORMATION>

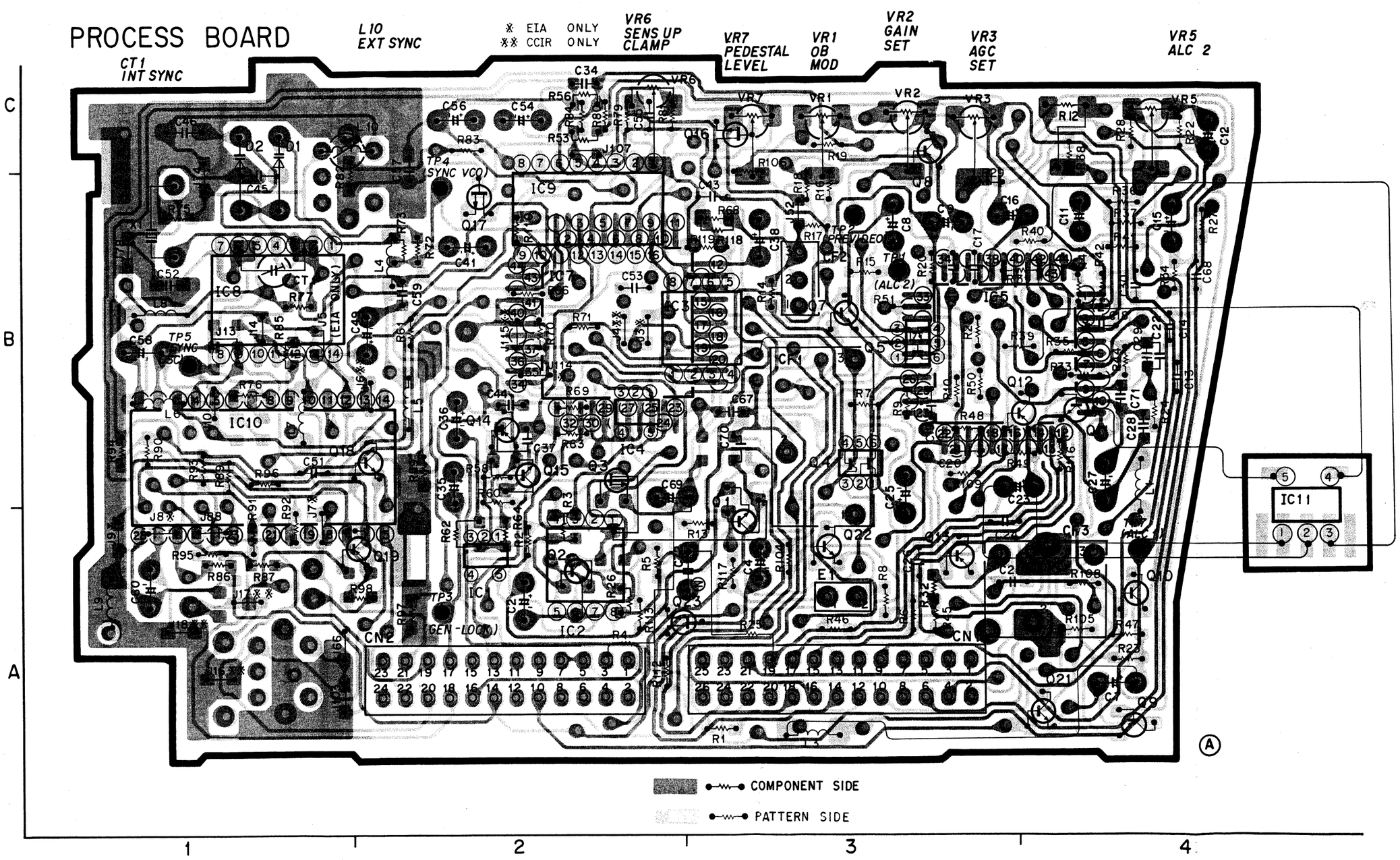
REF No.	Address
IC1	C1
IC2	C1
IC3	C2
IC4	C3
IC5	B3
IC7	C5
IC8	B4
IC9	C5
IC10	B4
IC11	B2
Q1	C2
Q2	C2
Q3	C3
Q4	C2
Q5	C2
Q7	C2
Q8	C3
Q9	C3
Q10	C3
Q11	B1
Q12	B1
Q13	B4
Q14	C4
Q15	C4
Q16	C5
Q17	B5
Q18	A5
Q19	A5
Q21	A2
Q22	C1
Q23	B2
D1	C4
D2	B4



SCHEMATIC DIAGRAM OF PROCESS BOARD



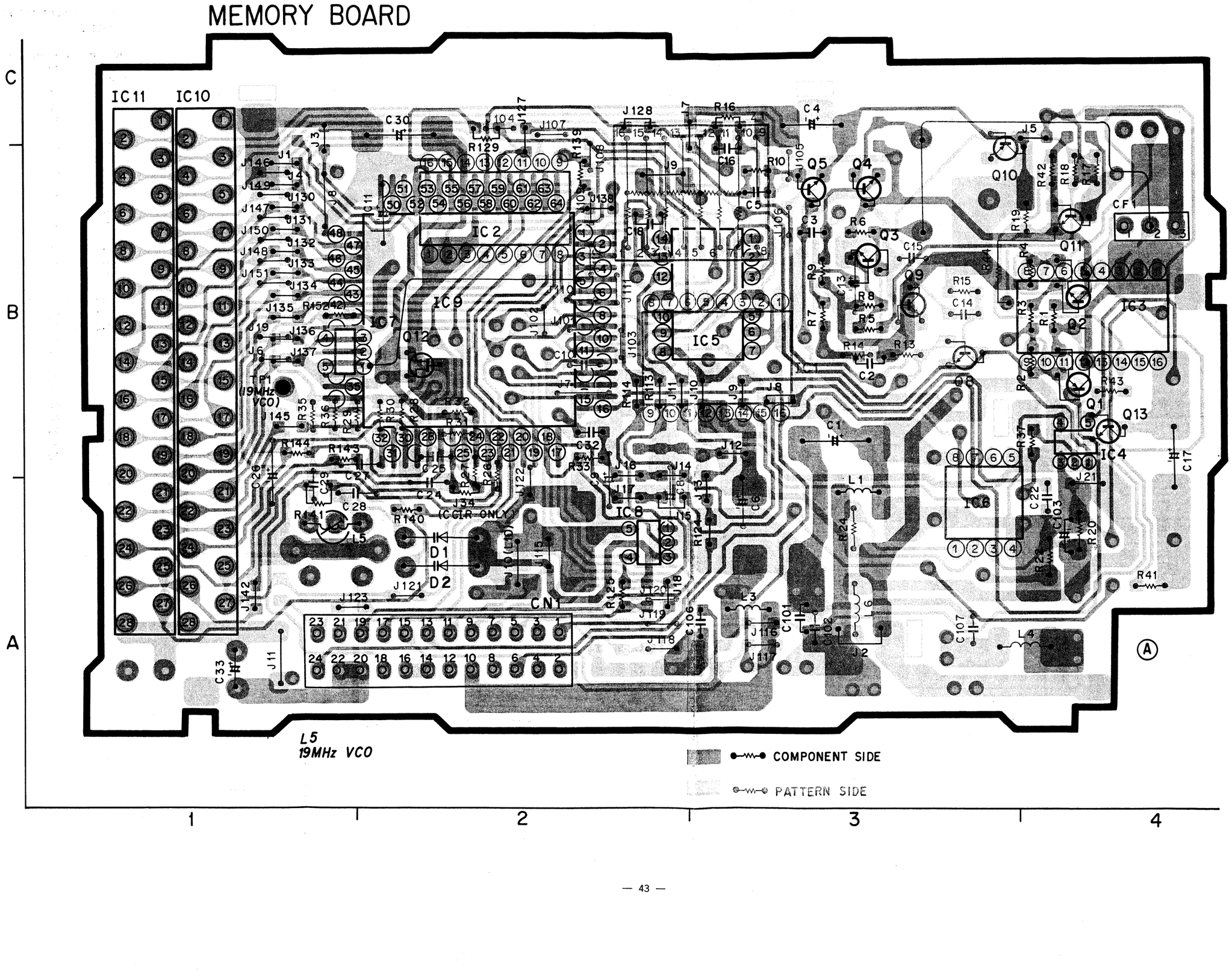
CONDUCTOR VIEW OF PROCESS BOARD



<ADDRESS INFORMATION>
PROCESS

REF No.	Address
IC1	A2
IC2	A2
IC3	B3
IC4	B2
IC5	B3
IC7	B2
IC8	B1
IC9	B2
IC10	B1
IC11	A4
Q1	A3
Q2	A2
Q3	B2
Q4	B3
Q5	B3
Q7	B3
Q8	C3
Q9	A4
Q10	A4
Q11	B4
Q12	B4
Q13	A3
Q14	B2
Q15	B2
Q16	C3
Q17	B2
Q18	B2
Q19	A2
Q21	A4
Q22	A3
Q23	A2
D1	C1
D2	C1

CONDUCTOR VIEW OF MEMORY BOARD



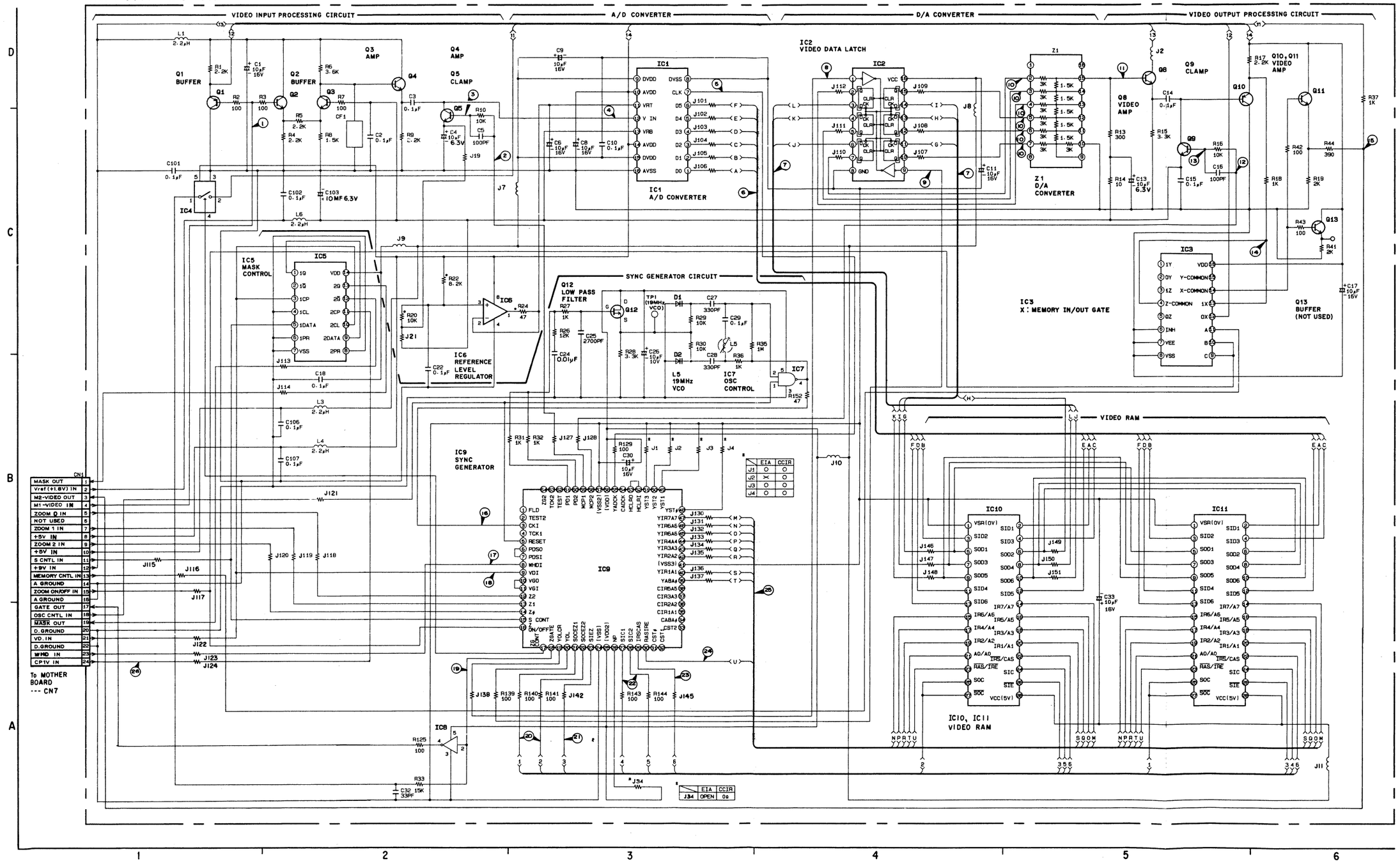
<ADDRESS INFORMATION>

MEMORY

REF No.	Address
IC1	B3
IC2	B2
IC3	B4
IC4	B4
IC5	B3
IC6	A3
IC7	B1
IC8	A2
IC9	B2
IC10	B1
IC11	B1
Q1	B4
Q2	B4
Q3	B3
Q4	B3
Q5	B3
Q8	B3
Q9	B3
Q10	B3
Q11	B4
Q12	B2
Q13	B4
D1	A2
D2	A2

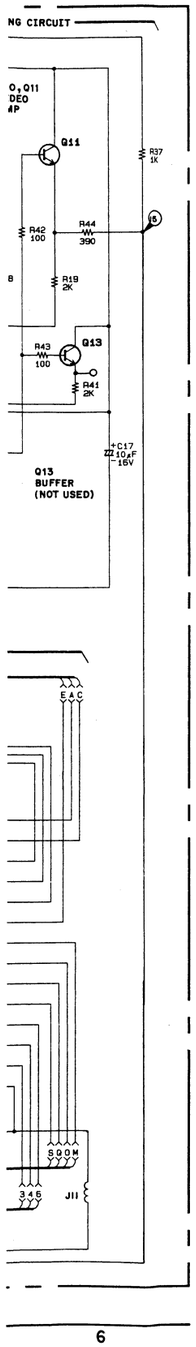
SCHEMATIC DIAGRAM OF MEMORY BOARD

MEMORY BOARD



<ADDRESS I

REF No.	A
IC1	
IC2	
IC3	
IC4	
IC5	
IC6	
IC7	
IC8	
IC9	
IC10	
IC11	
Q1	
Q2	
Q3	
Q4	
Q5	
Q8	
Q9	
Q10	
Q11	
Q12	
Q13	
D1	
D2	



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REF No.	Address
IC1	C3
IC2	C4
IC3	C5
IC4	C1
IC5	C2
IC6	C2
IC7	B4
IC8	A2
IC9	B3
IC10	B4
IC11	B5
Q1	D1
Q2	D2
Q3	D2
Q4	D2
Q5	D2
Q8	D5
Q9	C5
Q10	D5
Q11	D6
Q12	C3
Q13	C6
D1	C3
D2	B3

<VOLTAGES >

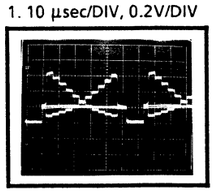
	IC1	IC2	IC3	IC4	IC5	IC6	IC7	IC8
Pin 1	0.9	4.0	0.1	4.1	0.5	3.8	4.9	0
2	1.3	2.0	0.1	1.9	4.5	3.6	2.2	4.1
3	2.2	1.8	0.1	0	0.2	3.6	0	0
4	0.2	1.2	2.6	0	0	0	4.7	0.8
5	0.1	1.3	2.6	5.0	0.5	1.9	5.0	5.0
6	0	0.2	0		0	1.2		
7	1.7	0.2	0		0	0		
8	0	0	0		0	5.0		
9	5.0	1.9	0		0.5			
10	5.0	0.2	0		0.2			
11	3.6	0.7	4.9		0.1			
12	2.0	1.3	2.5		4.5			
13	1.9	1.5	2.5		0.5			
14	5.0	1.6	2.5		5.0			
15	5.0	1.6	0.1					
16	0	5.0	5.0					

	IC10	IC11
Pin 1	0	0
2	1.2	1.2
3	1.3	1.3
4	2.2	2.2
5	1.0	1.0
6	1.4	1.4
7	2.2	2.2
8	2.1	2.1
9	0.1	0.1
10	0	0
11	0.2	0.2
12	0	0
13	0	0
14	0.3	0.3
15	0.2	0.2
16	0.2	0.2
17	0.2	0.2
18	0.3	0.3
19	0.3	0.3
20	0.2	0.2
21	0.1	0.1
22	4.9	4.9
23	4.9	4.9
24	1.8	2.6
25	3.6	3.5
26	0.8	0.8
27	3.6	3.5
28	5.0	5.0

	IC9		IC9		IC9		IC9
Pin 1	2.5	Pin17	0	Pin33	0	Pin49	0
2	0	18	4.1	34	0	50	5.0
3	3.3	19	4.0	35	0.3	51	0
4	5.0	20	0.7	36	0.3	52	0
5	4.9	21	1.4	37	0.3	53	0.7
6	0.1	22	1.4	38	0.2	54	0.6
7	0.1	23	0.8	39	0.1	55	0.6
8	0.7	24	0	40	0.2	56	5.0
9	0.2	25	5.0	41	0	57	0
10	0.2	26	0	42	0.3	58	0.2
11	0.2	27	0	43	0.3	59	0.2
12	0	28	0.4	44	0.2	60	2.2
13	0	29	4.9	45	0.2	61	2.2
14	0	30	4.9	46	0.2	62	0
15	0.5	31	0	47	0	63	5.0
16	0	32	0	48	0	64	-

	B	C	E
Q1	1.9	0	2.6
Q2	1.9	9.0	0
Q3	1.9	6.6	1.1
Q4	6.6	9.0	6.1
Q5	0.1	2.0	1.9
Q8	1.5	9.0	1.0
Q9	0.1	1.9	1.9
Q10	1.9	0	2.5
Q11	2.5	5.0	1.9
Q12	2.5	2.2	5.0
Q13	2.5	5.0	1.9

1. 10 μsec/DIV, 0.2V/DIV



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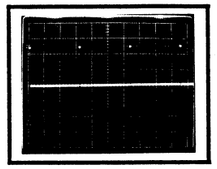

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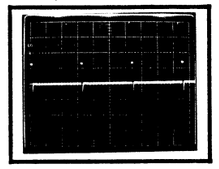
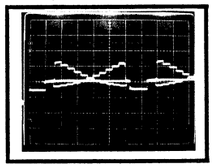
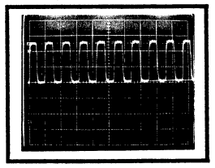


4. 10 μsec/DIV, 0.5V/DIV



5. 0.1 μsec/DIV, 2V/DIV



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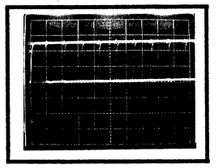

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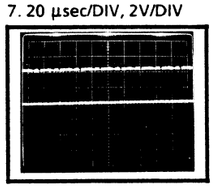

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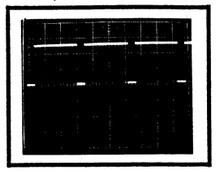

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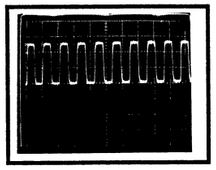

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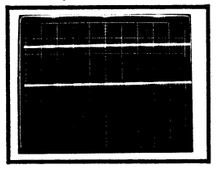

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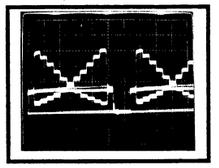

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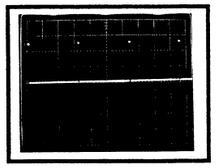

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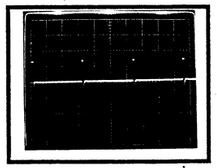

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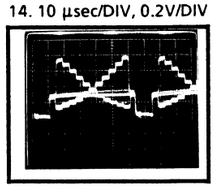

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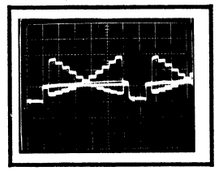

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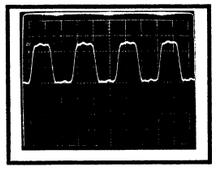

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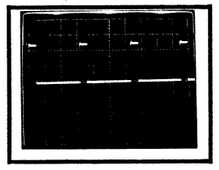
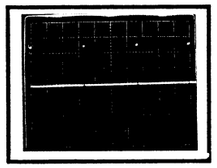
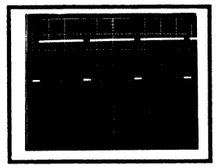


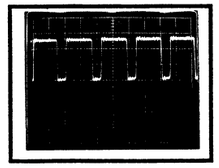
18. 5 msec/DIV, 2V/DIV



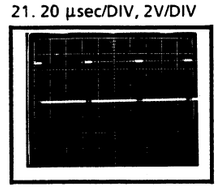
19. 20 μsec/DIV, 2V/DIV



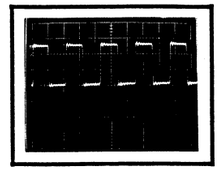
20. 0.1 μsec/DIV, 2V/DIV



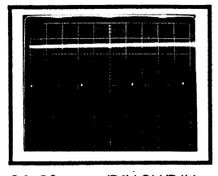
21. 20 μsec/DIV, 2V/DIV



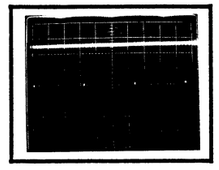
22. 0.1 μsec /DIV,2V/DIV



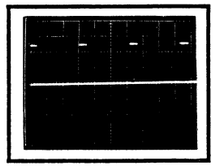
23. 20 μsec/DIV, 2V/DIV



24. 20 μsec /DIV,2V/DIV



25. 20 μsec/DIV, 2V/DIV



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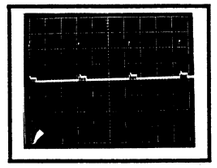
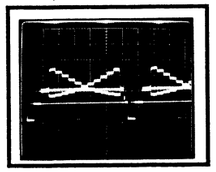
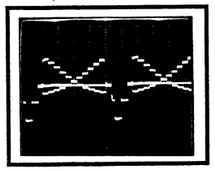


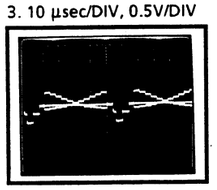
1. 10 µsec/DIV, 0.5V/DIV



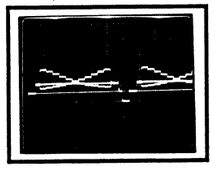
2. 10 µsec/DIV, 0.5V/DIV



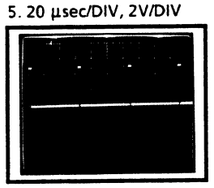
3. 10 µsec/DIV, 0.5V/DIV



4. 10 µsec/DIV, 0.5V/DIV



5. 20 µsec/DIV, 2V/DIV



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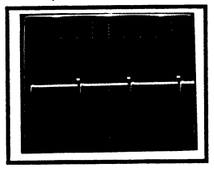
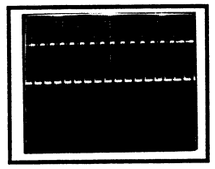
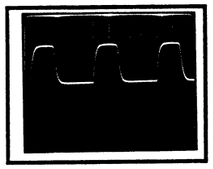


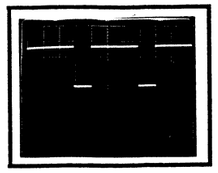
7. 0.1 msec/DIV, 2V/DIV



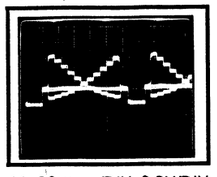
8. 5 msec/DIV, 2V/DIV



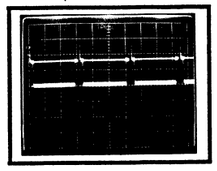
9. 5 msec/DIV, 2V/DIV



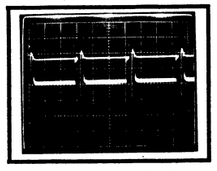
10. 10 µsec/DIV, 0.2V/DIV



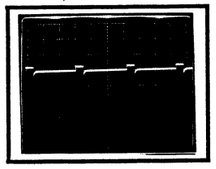
11. 20 µsec/DIV, 0.2V/DIV



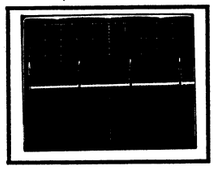
12. 20 µsec/DIV, 0.2V/DIV



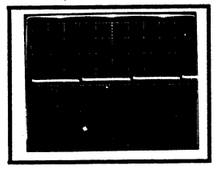
13. 20 µsec/DIV, 5V/DIV



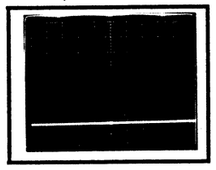
14. 20 µsec/DIV, 50V/DIV



15. 20 µsec/DIV, 50V/DIV



16. 20 µsec/DIV, 5V/DIV



<VOLTAGES>

	B	C	E
Q1	4.9	6.9	5.4
Q2	5.8	7.5	5.4
Q4	5.7	5.4	5.0
Q5	3.0	0	5.4
Q6	2.1	9.0	1.5
Q7	1.8	5.8	1.3
Q8	5.9	9.0	5.3
Q10	5.9	9.0	5.3
Q11	4.6	0	5.3
Q12	8.3	9.0	9.0
Q13	5.3	9.0	4.7
Q14	0	0.1	0
Q15	0.1	0	0.8
Q16	0.8	4.2	0.2
Q18	4.8	3.6	5.0
Q20	0.2	1.7	1.6
Q21	1.7	0	0.6
Q24	5.9	9.0	5.4
Q26	2.8	5.0	2.3
Q27	1.2	1.9	1.9
Q29	0.6	9.0	1.9

	Q 9	Q 19	Q 25
Pin 1	9.0	9.0	6.6
2	5.3	1.9	5.2
3	5.9	2.6	5.4
4	0	0	9.0
5	5.2	4.1	6.0
6	4.6	3.5	5.4

	G	D	S
Q 28	0	1.8	1.8

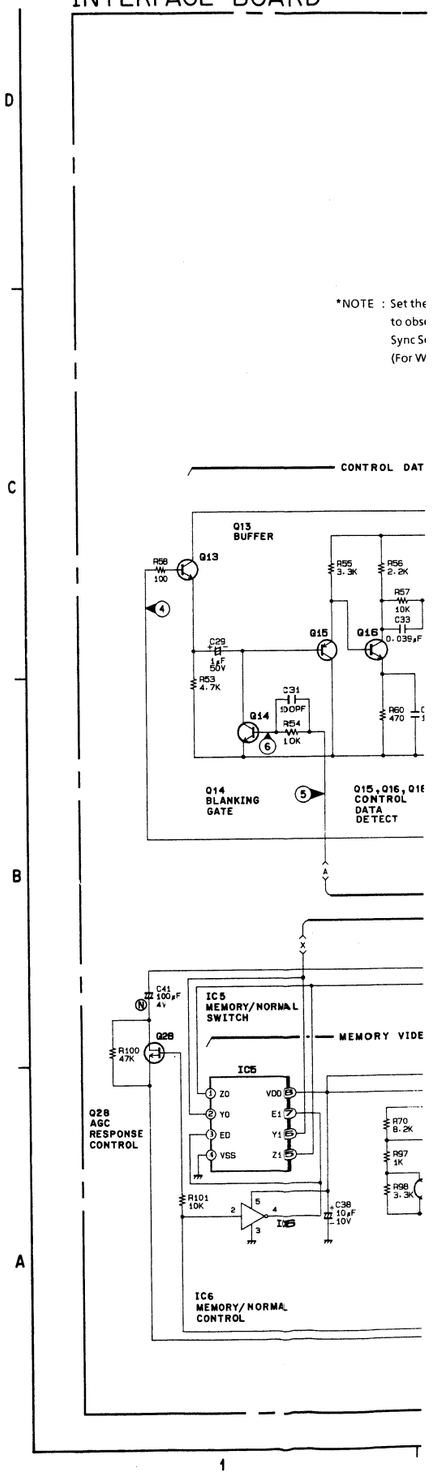
	IC2	IC3	IC5	IC6	IC7
Pin 1	5.9	7.5	2.0	0	0
2	5.4	0	2.0	0	2.8
3	5.4	1.2	5.0	0	2.8
4	0		0	5.0	0
5	5.0		2.0	5.0	1.8
6	5.0		0		2.8
7	5.7		5.0		0
8	9.0		5.0		5.0

	IC4
Pin 1	0
2	5.0
3	5.0
4	0
5	0
6	0
7	5.0
8	0
9	5.0
10	0
11	0
12	0
13	5.0
14	4.8
15	0
16	5.0

<ADDRESS INFORMATION>

REF No.	Address
IC2	C4
IC3	D3
IC4	C2
IC5	A1
IC6	A1
IC7	A2
Q1	D4
Q2	D4
Q4	C4
Q5	C4
Q6	C3
Q7	C3
Q8	C4
Q9	B4
Q10	C4
Q11	B4
Q12	B5
Q13	C1
Q14	B1
Q15	C1
Q16	C1
Q18	C2
Q19	A3
Q20	A3
Q21	A3
Q24	C4
Q25	B5
Q26	A2
Q27	A2
Q28	B1
Q29	A3
D1	D3
D2	D4
D3	D5
D6	D5
D8	C5
D9	A2
D10	A3

INTERFACE BOARD



SCHEMATIC DIAGRAM OF INTERFACE BOARD

INTERFACE BOARD

*NOTE : Set the switch on the camera as follows to observe point ⑧ or ⑨.
Sync Selection Switch ··· LL position
(For WV-BL600 and WV-BL604)

REGULATOR CIRCUIT

IC3 +9V REGULATOR

VR1 (+9V)

TP1 (+9V)

TP2 (GROUND)

Q1,Q2 PULSE DRIVE

IC2(a),Q5,Q24 +5.3V REGULATOR

IC2(b),Q4 +5V REGULATOR

CONTROL DATA DETECT CIRCUIT

Q13 BUFFER

Q14 BLANKING GATE

Q15,Q16,Q18 CONTROL DATA DETECT

IC4 V.PHASE CONTROL

VIDEO OUTPUT CIRCUIT

Q6 VIDEO AMP

Q7,Q8 CONTROL DATA DETECT

Q9~Q11 VIDEO AMP

Q12,Q25 Vd DET

TP7 (VIDEO OUT)

To MOTHER BOARD ---CN1

CN1	
1	+5V OUT
2	+5V OUT
3	-11V OUT
4	-11V OUT
5	GROUND
6	GROUND
7	Vd OUT
8	IFCP IN
9	VLP OUT
10	D OUT
11	FP IN
12	V.PHASE IN
13	GROUND
14	GROUND
15	+5V OUT
16	COLLECTOR IN
17	+5V OUT
18	WHD.D IN
19	+9V OUT
20	+9V OUT
21	+12V IN
22	BASE IN
23	+12V IN
24	EMITTER OUT

MEMORY VIDEO CONTROL CIRCUIT

MEMORY VIDEO AGC AMPLIFIER CIRCUIT

IC5 MEMORY/NORMAL SWITCH

IC6 MEMORY/NORMAL CONTROL

Q28 AGC RESPONSE CONTROL

IC7,Q26,Q27 AGC LEVEL DETECTOR

IC7(a)

IC7(b)

Q19 MEMORY VIDEO AGC AMP

Q20 CLAMP

Q21 MEMORY VIDEO AGC AMP

Q29 VIDEO AMP

D10

VR2 AGC DET CLAMP

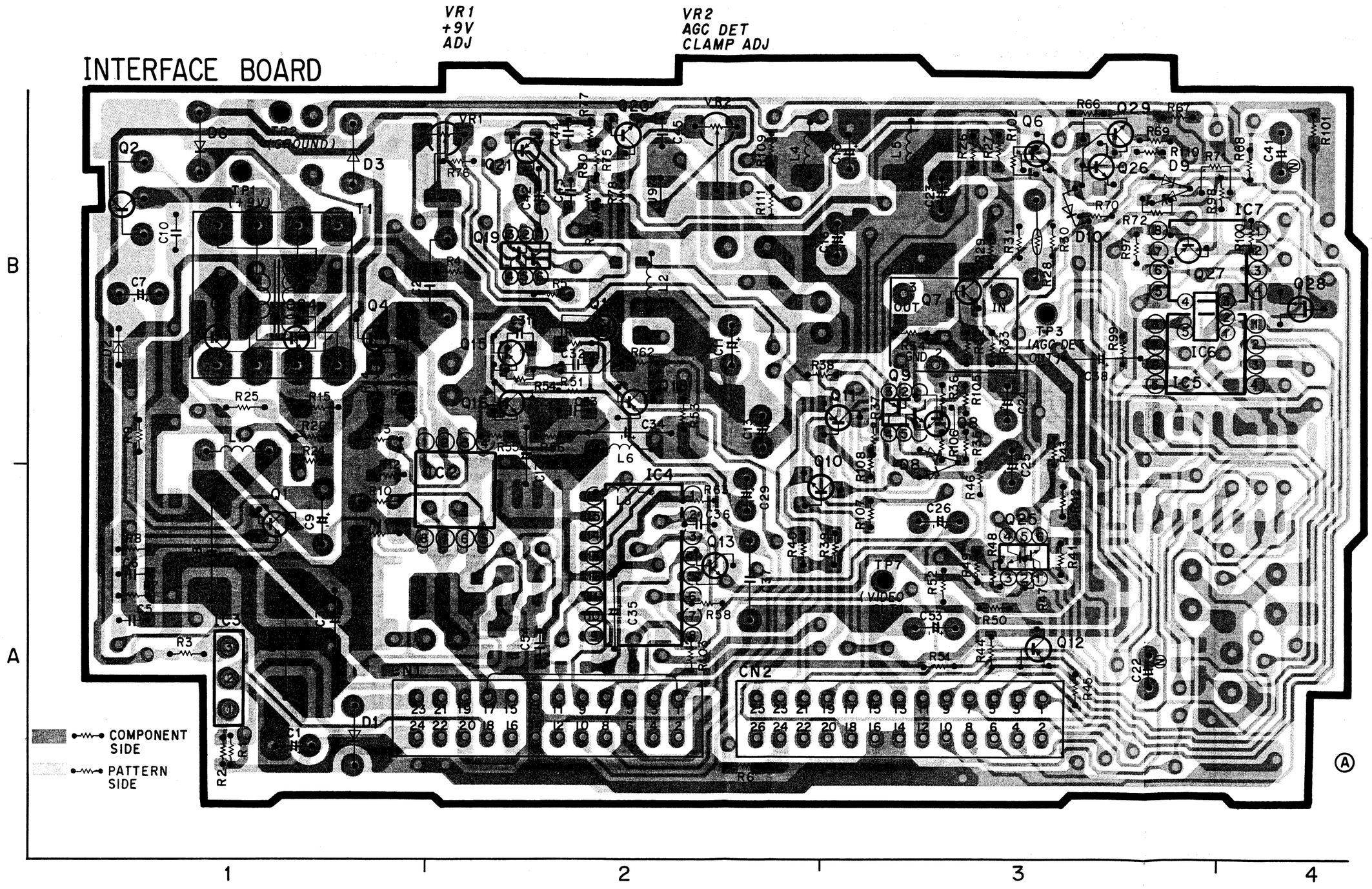
TP3 (AGC DET OUT)

To MOTHER BOARD ---CN2

CN2	
1	NOT USED
2	NOT USED
3	AGC DET OUT
4	AGC DC CNTL IN
5	AGC DET IN
6	MEMORY CNTL IN
7	AUTO UP OUT
8	AUTO DOWN OUT
9	NOT USED
10	NOT USED
11	VIDEO GROUND
12	VIDEO GROUND
13	VIDEO OUT
14	GROUND
15	NOT USED
16	GROUND
17	IC VIDEO IN
18	IRIS OPEN IN
19	Vref (+1.8V) IN
20	NOT USED
21	CP2 IN
22	D IN
23	M2 VIDEO IN
24	LED OUT
25	+20V OUT
26	+20V OUT

1 2 3 4 5 6

CONDUCTOR VIEW OF INTERFACE BOARD



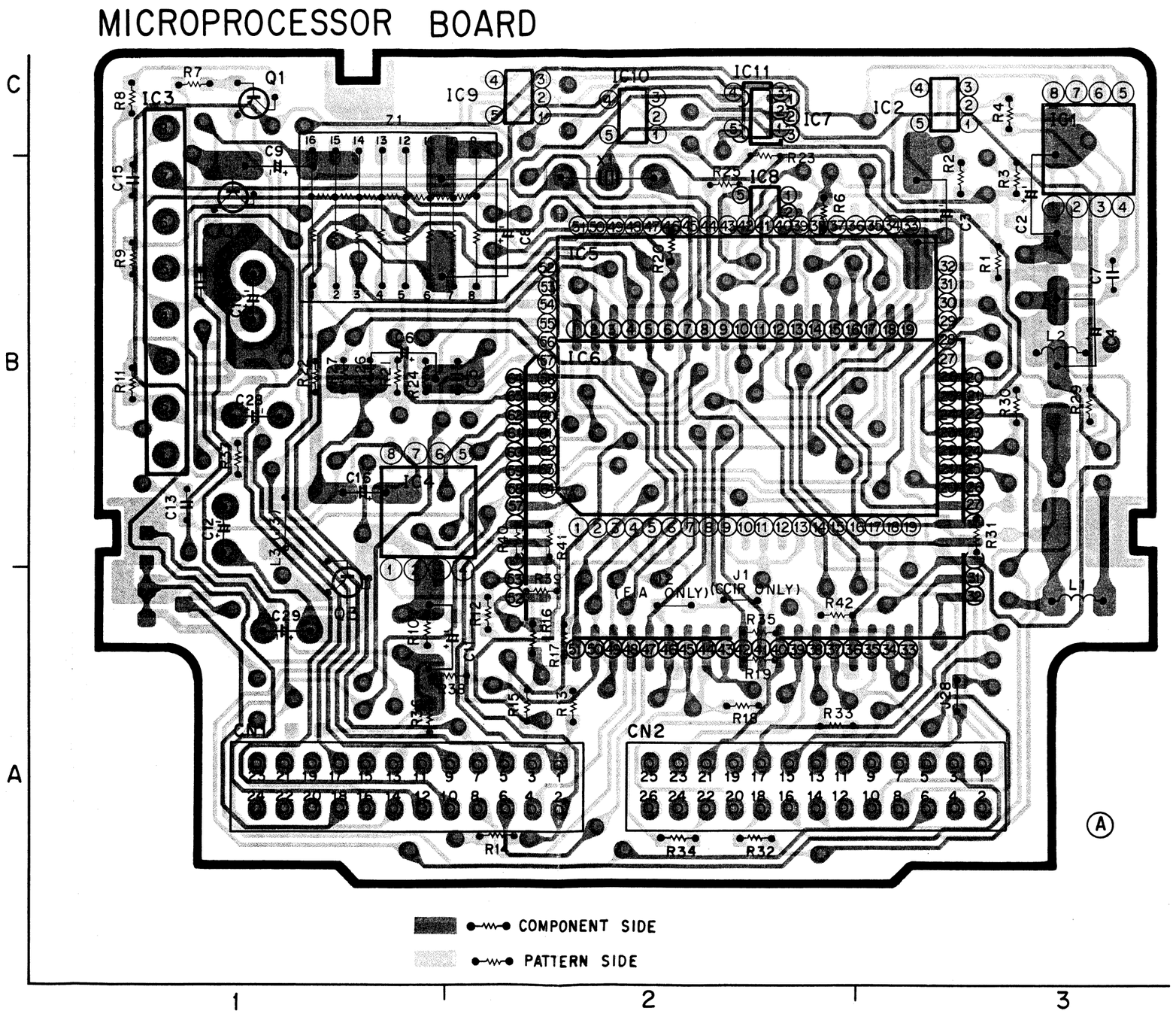
INTERFACE

REF No.	Address
IC2	A2
IC3	A1
IC4	A2
IC5	B3
IC6	B3
IC7	B3
Q1	A1
Q2	B1
Q4	B1
Q5	B1
Q6	B3
Q7	B3
Q8	B3
Q9	B3
Q10	A3
Q11	B3
Q12	A3
Q13	A2
Q14	B2
Q15	B2
Q16	B2
Q18	B2
Q19	B2
Q20	B2
Q21	B2
Q24	B1
Q25	A3
Q26	B3
Q27	B3
Q28	B4
Q29	B3
D1	A1
D2	B1
D3	B1
D6	B1
D8	A3
D9	B3
D10	B3

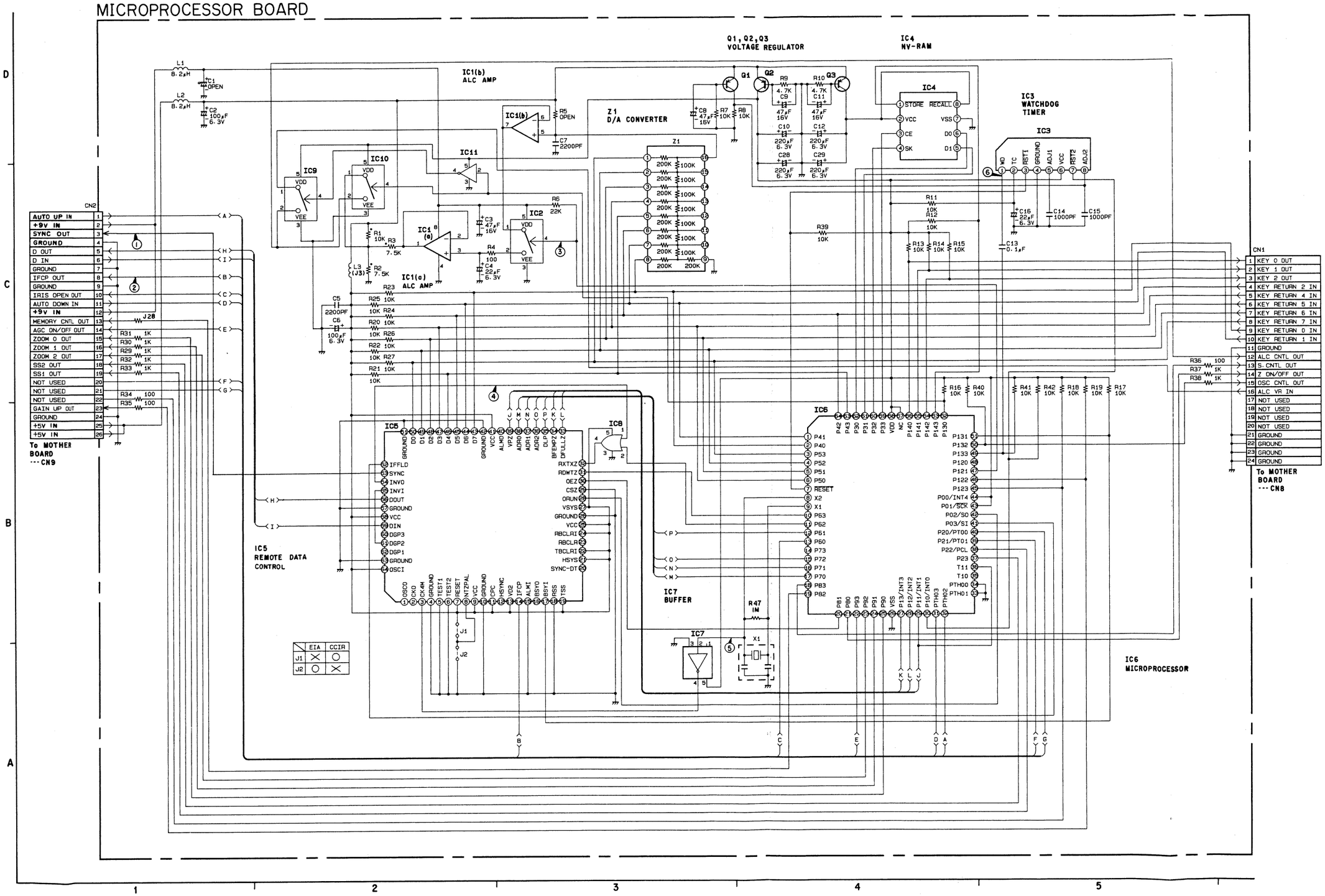
CONDUCTOR VIEW OF MICROPROCESSOR BOARD

<ADDRESS INFORMATION>
MICROPROCESSOR

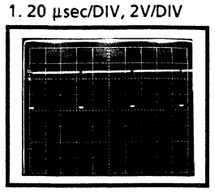
REF No.	Address
IC1	C3
IC2	C3
IC3	B1
IC4	B1
IC5	B2
IC6	B2
IC7	C2
IC8	B2
IC9	C2
IC10	C2
IC11	C2
Q1	C1
Q2	B1
Q3	A1



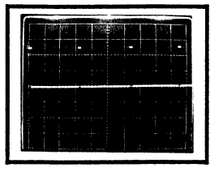
SCHEMATIC DIAGRAM OF MICROPROCESSOR BOARD



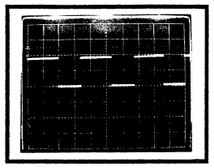
1. 20 µsec/DIV, 2V/DIV



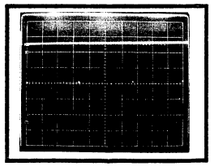
2. 20 µsec/DIV, 2V/DIV



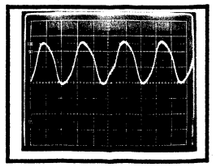
3. 5 msec/DIV, 5V/DIV



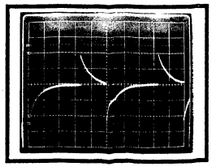
4. 5 msec/DIV, 5V/DIV



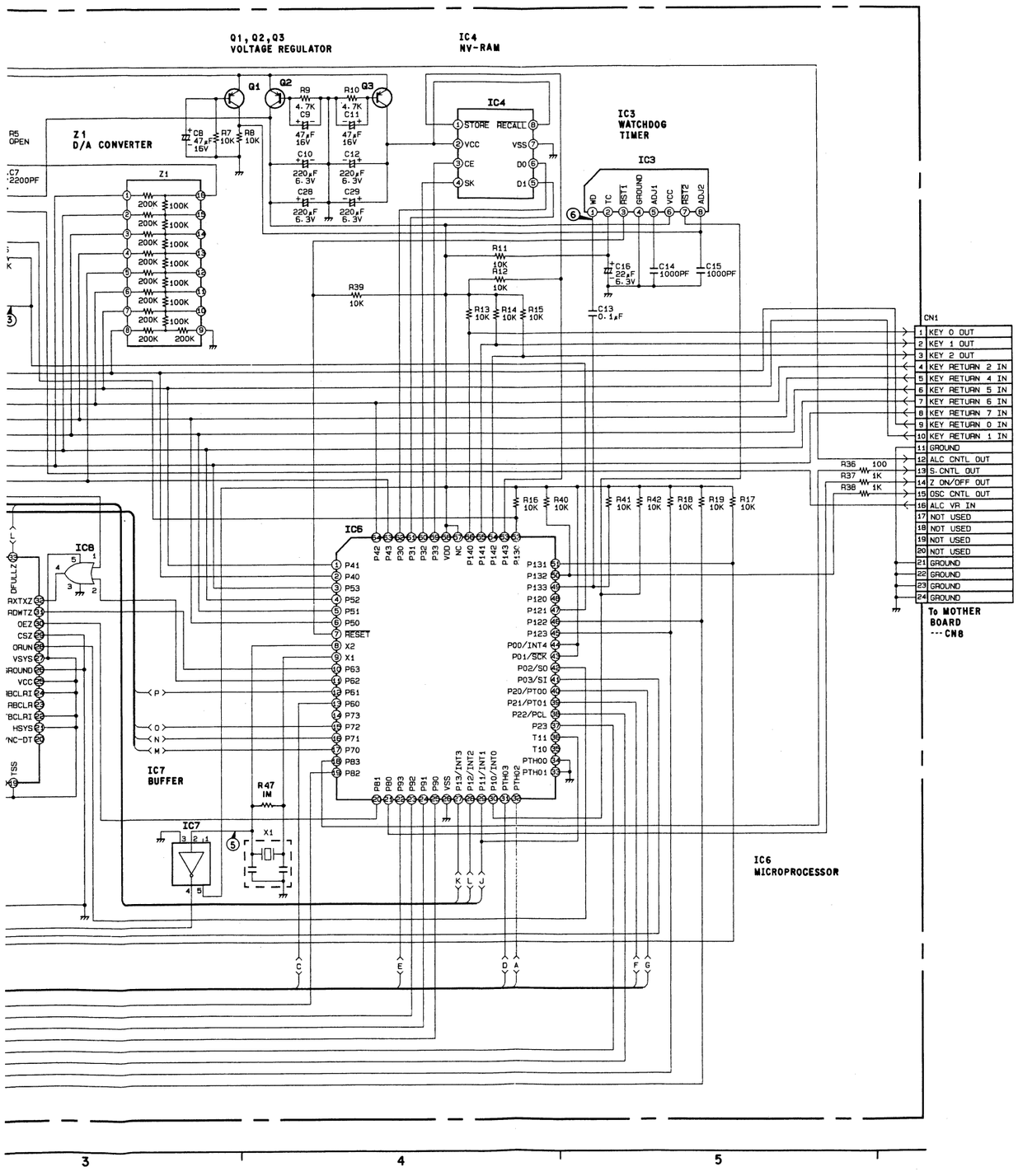
5. 0.1 µsec/DIV, 2V/DIV



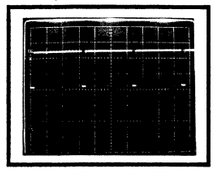
6. 10 msec/DIV, 2V/DIV



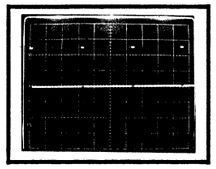
TIC DIAGRAM OF MICROPROCESSOR BOARD



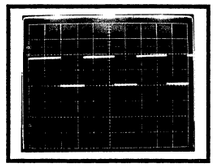
1. 20 µsec/DIV, 2V/DIV



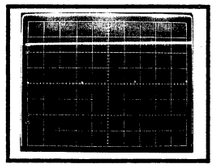
2. 20 µsec/DIV, 2V/DIV



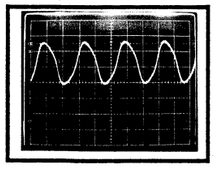
3. 5 msec/DIV, 5V/DIV



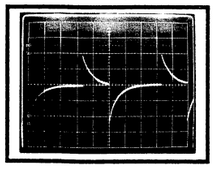
4. 5 msec/DIV, 5V/DIV



5. 0.1 µsec/DIV, 2V/DIV



6. 10 msec/DIV, 2V/DIV



REF No.	Address
IC1	C2, D3
IC2	C3
IC3	D5
IC4	D4
IC5	B2
IC6	B4
IC7	A3
IC8	B3
IC9	C2
IC10	C2
IC11	C2
Q1	D3
Q2	D4
Q3	D4

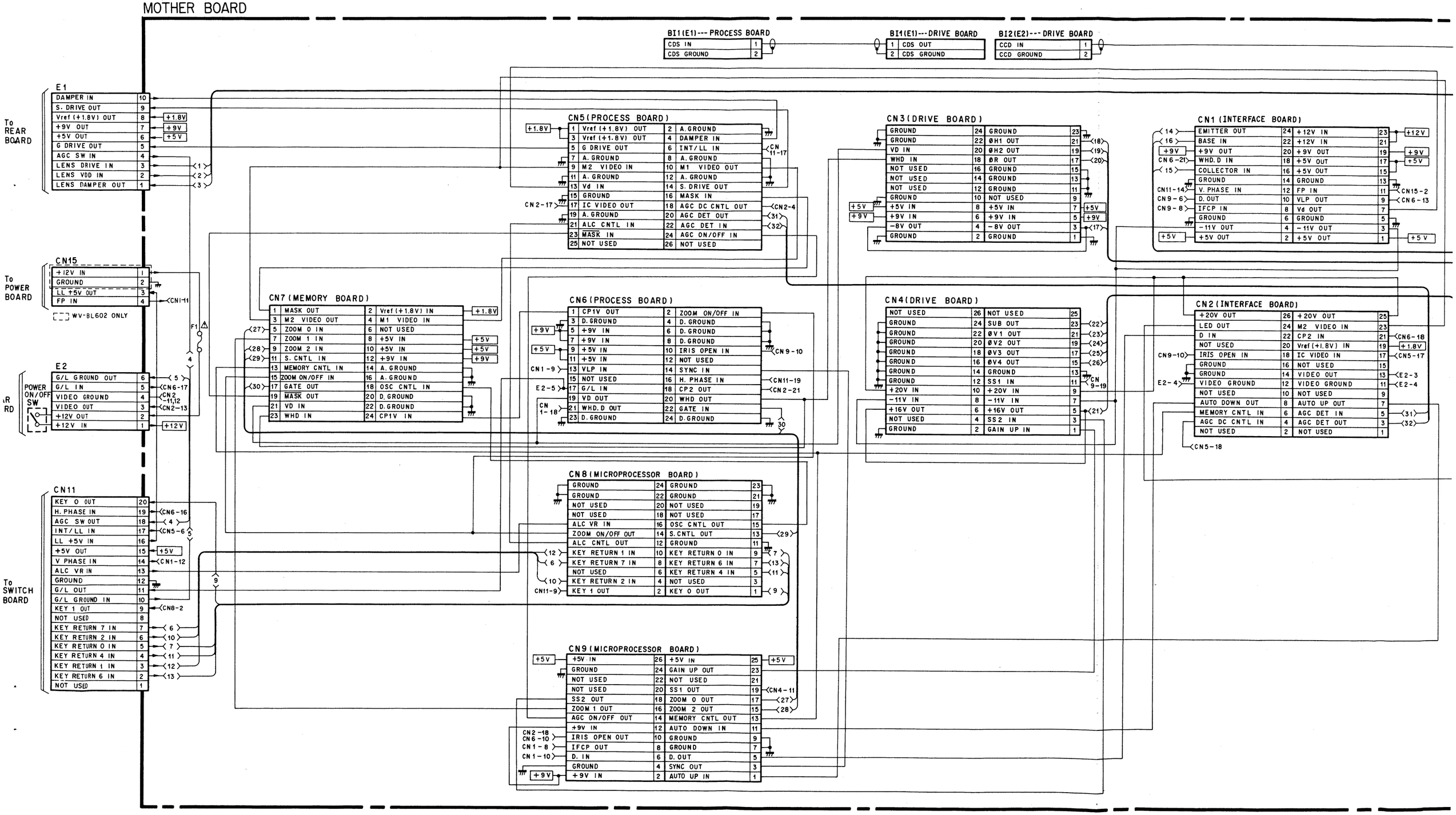
	IC5	IC6		IC5	IC6		IC5	IC6		IC5	IC6
Pin 1	0	4.9	Pin17	0	0	Pin33	5.0	0	Pin49	4.9	1.5
2	5.0	4.9	18	0	4.9	34	5.0	0	50	4.9	0
3	2.4	4.9	19	5.0	0	35	4.9	0.2	51	0	0
4	0	4.9	20	5.0	4.9	36	0	4.9	52	2.5	0
5	0	2.1	21	5.0	0	37	0	0	53	4.4	4.9
6	0	2.1	22	5.0	4.8	38	0	0	54	4.9	4.9
7	0	4.9	23	5.0	0	39	4.9	1.6	55	0.1	4.8
8	0	2.5	24	0	0	40	0	1.6	56	0	4.8
9	5.0	2.4	25	5.0	0	41	5.0	2.5	57	0	4.9
10	0	4.9	26	0	0	42	0	0	58	5.0	4.9
11	5.0	4.9	27	5.0	5.0	43	4.9	4.9	59	3.4	1.5
12	4.5	4.9	28	0	5.0	44	4.9	4.9	60	0.1	0.1
13	5.0	0	29	0	4.9	45	4.9	0	61	0.1	0.6
14	0.3	0	30	4.9	4.9	46	4.9	0	62	0.1	0.3
15	0	0	31	4.9	0	47	2.1	5.2	63	0	4.9
16	0	0	32	5.0	0	48	2.1	0.1	64	5.0	4.9

	IC1	IC2	IC3	IC4
Pin 1	4.0	4.3	-	4.9
2	4.0	4.0	2.2	4.9
3	4.0	0	4.9	1.5
4	0	5.2	0	0.1
5	4.3	9.0	1.4	0.6
6	4.3		4.9	0.4
7	4.3		4.9	0
8	9.0		4.9	4.9

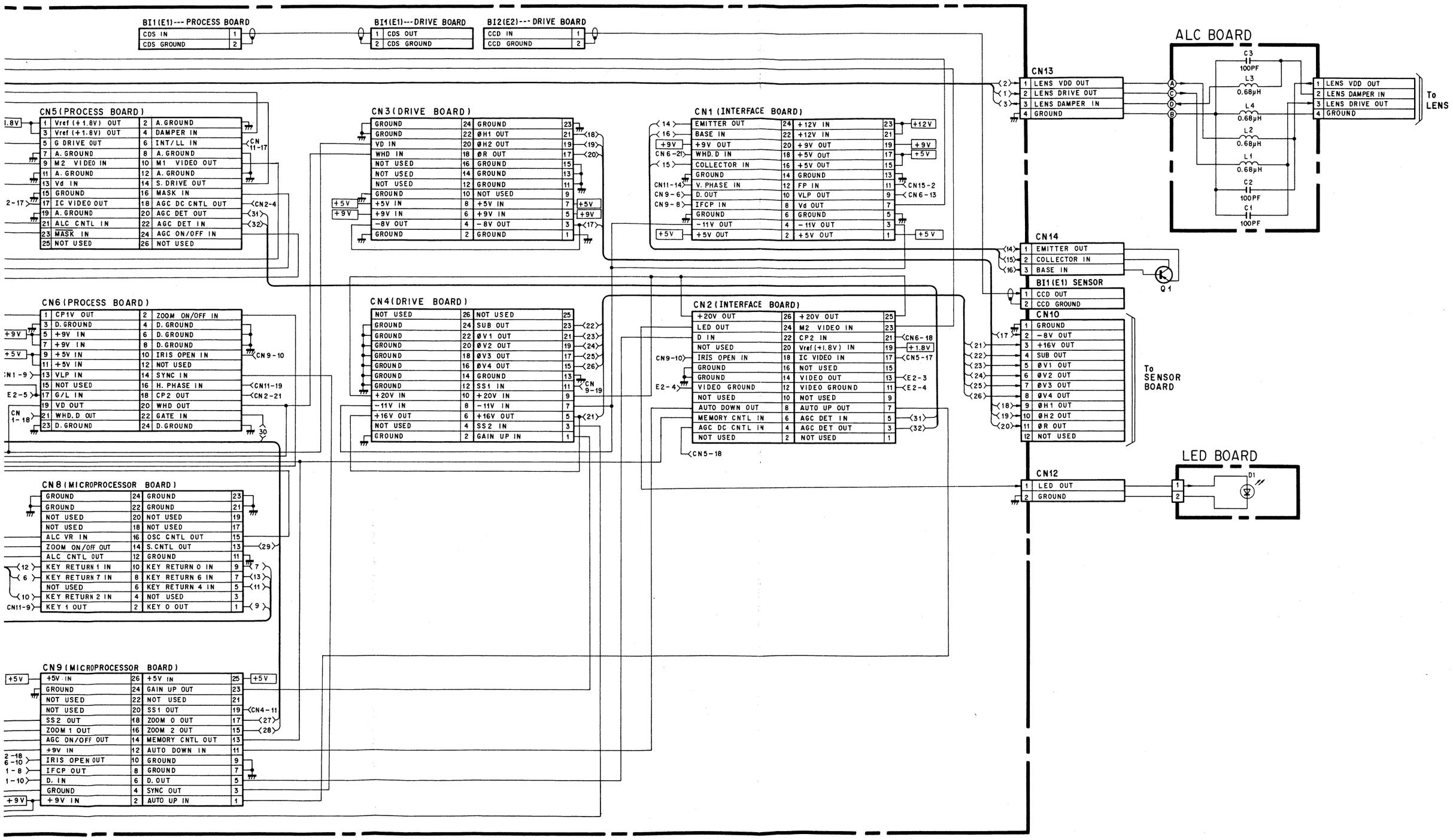
	IC7	IC8	IC9	IC10	IC11
Pin 1	0	4.9	1.3	2.8	0
2	2.5	4.9	1.3	1.3	0
3	0	0	0	0	0
4	2.4	5.0	4.9	0	4.9
5	4.9	5.0	4.9	4.9	4.9

	B	C	E
Q1	4.3	4.9	5.0
Q2	4.2	4.9	5.0
Q3	4.2	4.9	5.0

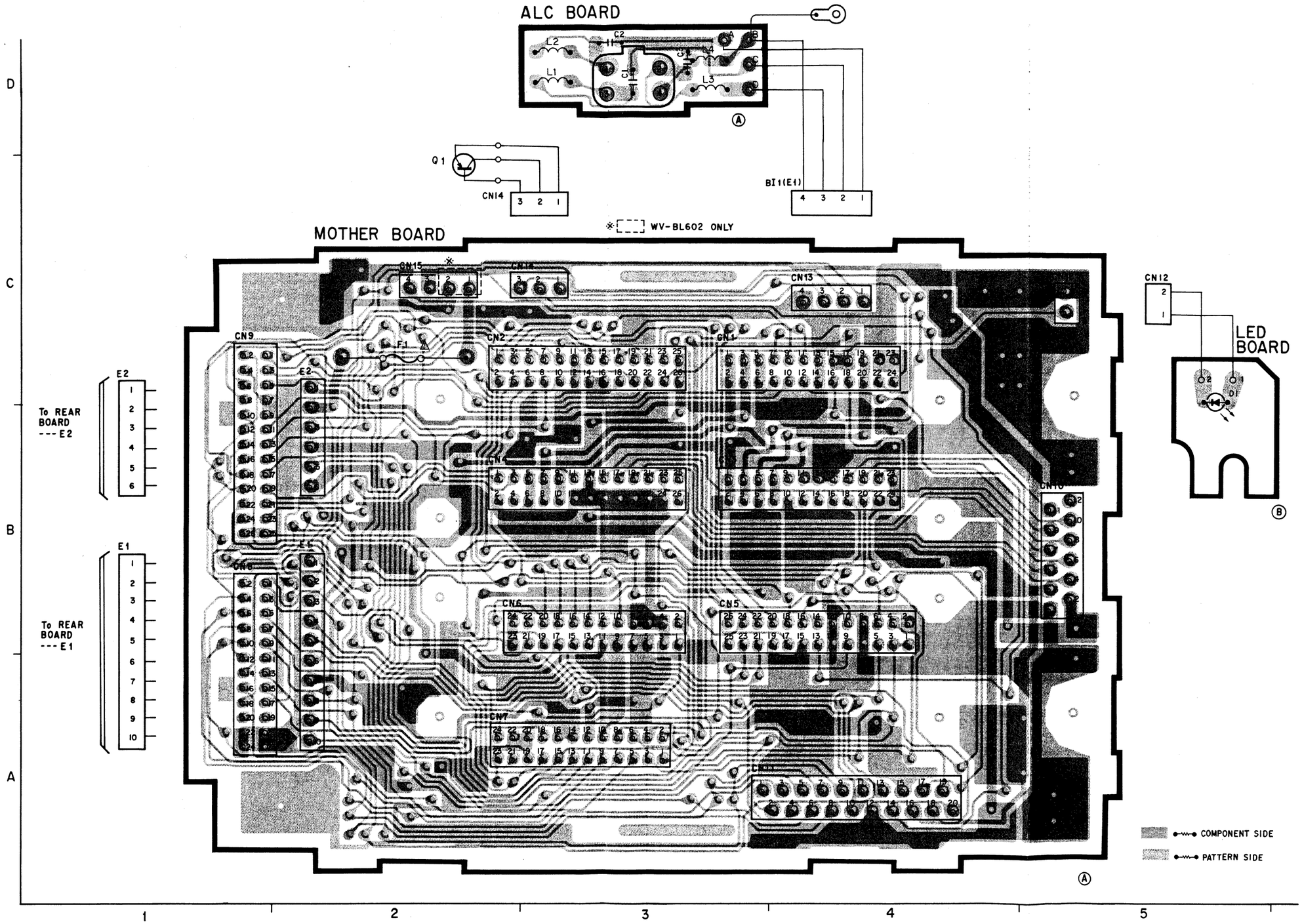
SCHEMATIC DIAGRAM OF MOTHER BOARD



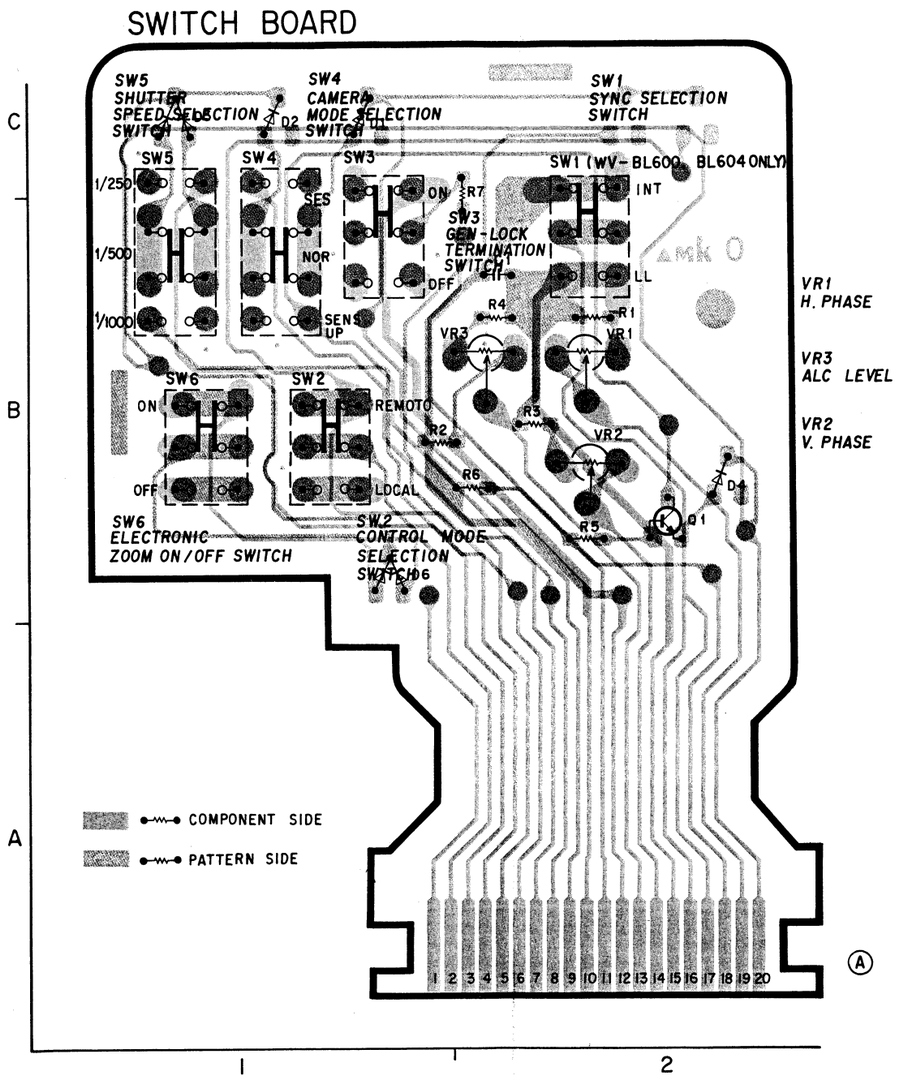
SCHEMATIC DIAGRAM OF MOTHER BOARD


BI1(E1)--- PROCESS BOARD
CDS IN 1
CDS GROUND 2
BI1(E1)--- DRIVE BOARD
1 CDS OUT
2 CDS GROUND
BI2(E2)--- DRIVE BOARD
CCD IN 1
CCD GROUND 2
CN5(PROCESS BOARD)
1 Vref (+1.8V) OUT 2 A.GROUND
3 Vref (+1.8V) OUT 4 DAMPER IN
5 G DRIVE OUT 6 INT/LL IN
7 A. GROUND 8 A. GROUND
9 M2 VIDEO IN 10 M1 VIDEO OUT
11 A. GROUND 12 A. GROUND
13 Vd IN 14 S. DRIVE OUT
15 GROUND 16 MASK IN
17 IC VIDEO OUT 18 AGC DC CNTL OUT
19 A. GROUND 20 AGC DET OUT
21 ALC CNTL IN 22 AGC DET IN
23 MASK IN 24 AGC ON/OFF IN
25 NOT USED 26 NOT USED
CN3(DRIVE BOARD)
GROUND 24 GROUND 23
GROUND 22 ØH1 OUT 21
VD IN 20 ØH2 OUT 19
WHD IN 18 ØR OUT 17
NOT USED 16 GROUND 15
NOT USED 14 GROUND 13
NOT USED 12 GROUND 11
GROUND 10 NOT USED 9
+5V IN 8 +5V IN 7
+9V IN 6 +9V IN 5
-8V OUT 4 -8V OUT 3
GROUND 2 GROUND 1
CN1(INTERFACE BOARD)
EMITTER OUT 24 +12V IN 23
BASE IN 22 +12V IN 21
+9V OUT 20 +9V OUT 19
WHD.D IN 18 +5V OUT 17
COLLECTOR IN 16 +5V OUT 15
GROUND 14 GROUND 13
V. PHASE IN 12 FP IN 11
D. OUT 10 VLP OUT 9
IFCP IN 8 Vd OUT 7
GROUND 6 GROUND 5
-11V OUT 4 -11V OUT 3
+5V OUT 2 +5V OUT 1
CN13
1 LENS VDD OUT
2 LENS DRIVE OUT
3 LENS DAMPER IN
4 GROUND
ALC BOARD
C3 100PF
L3 0.68µH
L4 0.68µH
L2 0.68µH
L1 0.68µH
C2 100PF
C1 100PF
1 LENS VDD OUT
2 LENS DAMPER IN
3 LENS DRIVE OUT
4 GROUND
To LENS
CN14
1 EMITTER OUT
2 COLLECTOR IN
3 BASE IN
Q1
BI1(E1) SENSOR
1 CCD OUT
2 CCD GROUND
CN10
1 GROUND
2 -8V OUT
3 +16V OUT
4 SUB OUT
5 ØV1 OUT
6 ØV2 OUT
7 ØV3 OUT
8 ØV4 OUT
9 ØH1 OUT
10 ØH2 OUT
11 ØR OUT
12 NOT USED
To SENSOR BOARD
CN6(PROCESS BOARD)
1 CP1V OUT 2 ZOOM ON/OFF IN
3 D. GROUND 4 D. GROUND
5 +9V IN 6 D. GROUND
7 +9V IN 8 D. GROUND
9 +5V IN 10 IRIS OPEN IN
11 +5V IN 12 NOT USED
13 VLP IN 14 SYNC IN
15 NOT USED 16 H. PHASE IN
17 G/L IN 18 CP2 OUT
19 VD OUT 20 WHD OUT
21 WHD.D OUT 22 GATE IN
23 D. GROUND 24 D. GROUND
CN4(DRIVE BOARD)
NOT USED 26 NOT USED 25
GROUND 24 SUB OUT 23
GROUND 22 ØV1 OUT 21
GROUND 20 ØV2 OUT 19
GROUND 18 ØV3 OUT 17
GROUND 16 ØV4 OUT 15
GROUND 14 GROUND 13
GROUND 12 SS1 IN 11
+20V IN 10 +20V IN 9
-11V IN 8 -11V IN 7
+16V OUT 6 +16V OUT 5
NOT USED 4 SS2 IN 3
GROUND 2 GAIN UP IN 1
CN2(INTERFACE BOARD)
+20V OUT 26 +20V OUT 25
LED OUT 24 M2 VIDEO IN 23
D IN 22 CP2 IN 21
NOT USED 20 Vref (+1.8V) IN 19
IRIS OPEN IN 18 IC VIDEO IN 17
GROUND 16 NOT USED 15
GROUND 14 VIDEO OUT 13
VIDEO GROUND 12 VIDEO GROUND 11
NOT USED 10 NOT USED 9
AUTO DOWN OUT 8 AUTO UP OUT 7
MEMORY CNTL IN 6 AGC DET IN 5
AGC DC CNTL IN 4 AGC DET OUT 3
NOT USED 2 NOT USED 1
CN12
1 LED OUT
2 GROUND
LED BOARD
D1
CN8(MICROPROCESSOR BOARD)
GROUND 24 GROUND 23
GROUND 22 GROUND 21
NOT USED 20 NOT USED 19
NOT USED 18 NOT USED 17
ALC VR IN 16 OSC CNTL OUT 15
ZOOM ON/OFF OUT 14 S. CNTL OUT 13
ALC CNTL OUT 12 GROUND 11
KEY RETURN 1 IN 10 KEY RETURN 0 IN 9
KEY RETURN 7 IN 8 KEY RETURN 6 IN 7
NOT USED 6 KEY RETURN 4 IN 5
KEY RETURN 2 IN 4 NOT USED 3
KEY 1 OUT 2 KEY 0 OUT 1
CN9(MICROPROCESSOR BOARD)
+5V IN 26 +5V IN 25
GROUND 24 GAIN UP OUT 23
NOT USED 22 NOT USED 21
NOT USED 20 SS1 OUT 19
SS2 OUT 18 ZOOM 0 OUT 17
ZOOM 1 OUT 16 ZOOM 2 OUT 15
AGC ON/OFF OUT 14 MEMORY CNTL OUT 13
+9V IN 12 AUTO DOWN IN 11
IRIS OPEN OUT 10 GROUND 9
IFCP OUT 8 GROUND 7
D. IN 6 D. OUT 5
GROUND 4 SYNC OUT 3
+9V IN 2 AUTO UP IN 1

CONDUCTOR VIEW OF MOTHER BOARD



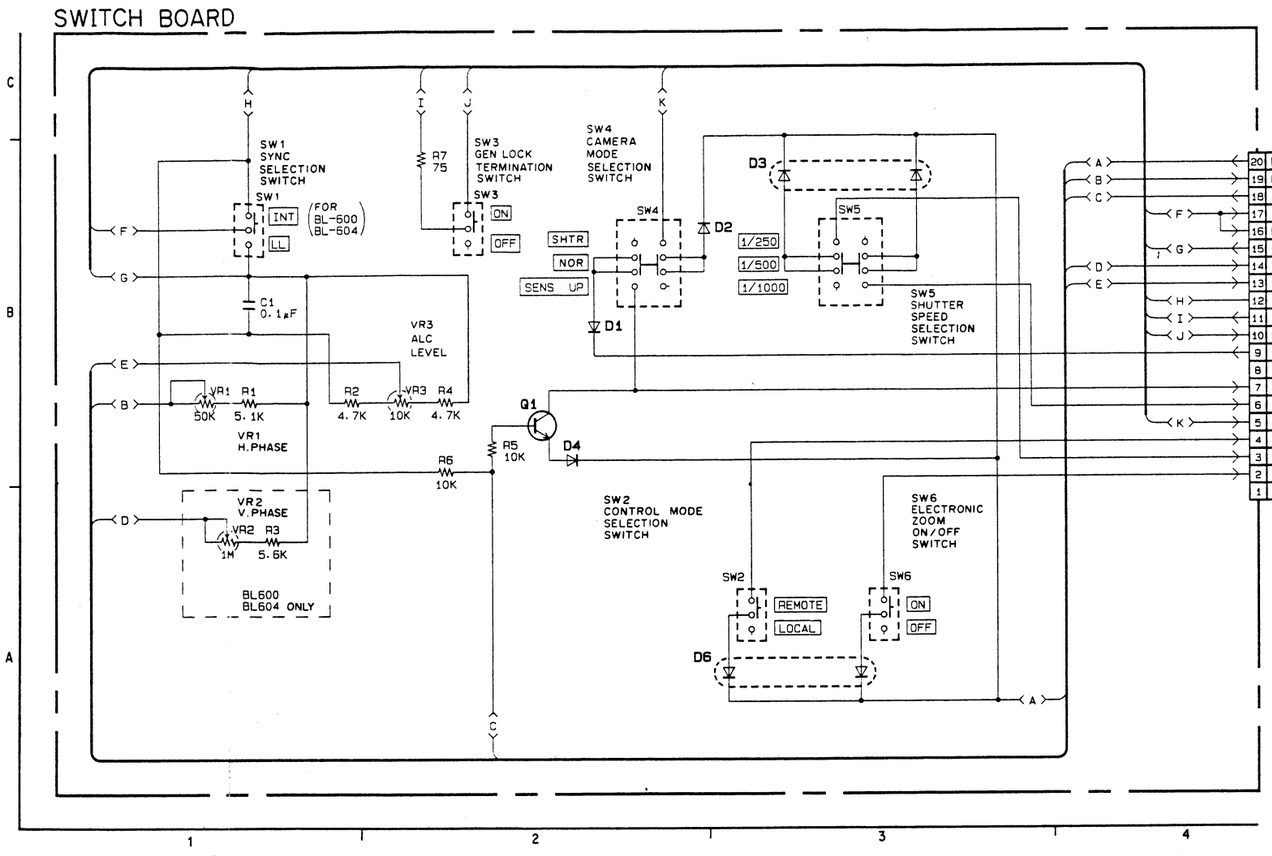
CONDUCTOR VIEW OF SWITCH BOARD


SWITCH BOARD
SW5 SHUTTER SPEED SELECTION SWITCH
SW4 CAMERA MODE SELECTION SWITCH
SW1 SYNC SELECTION SWITCH
SW1 (WV-BL600, BL604 ONLY)
SW3 GEN-LOCK TERMINATION SWITCH
SW6 ELECTRONIC ZOOM ON/OFF SWITCH
SW2 CONTROL MODE SELECTION SWITCH
VR1 H. PHASE
VR3 ALC LEVEL
VR2 V. PHASE
COMPONENT SIDE
PATTERN SIDE
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
A
1
2

<ADDRESS INFORMATION>

REF No.	Address
Q1	B2
D1	C1
D2	C1
D3	C1
D4	B2
D6	B1

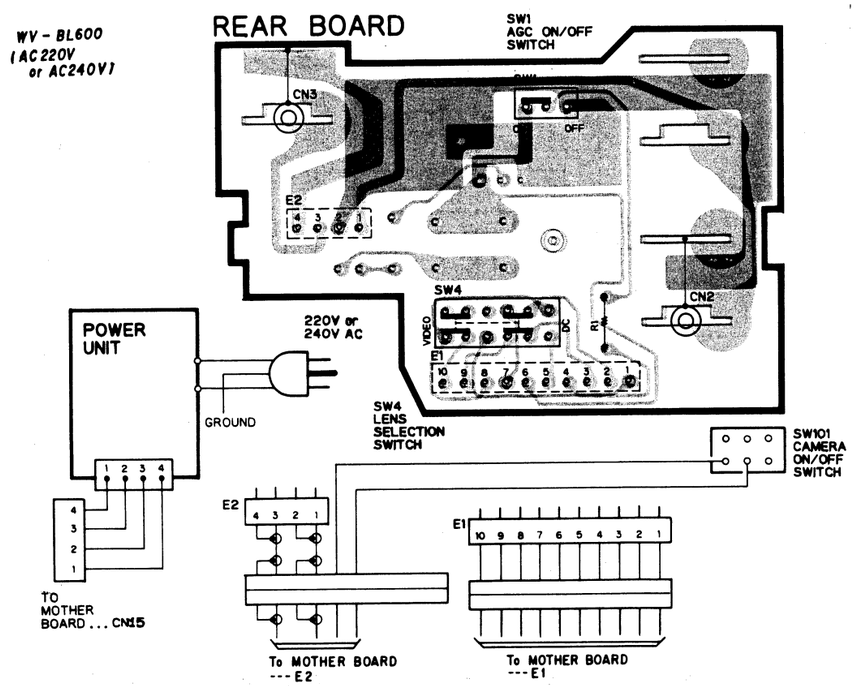
SCHEMATIC DIAGRAM OF SWITCH BOARD

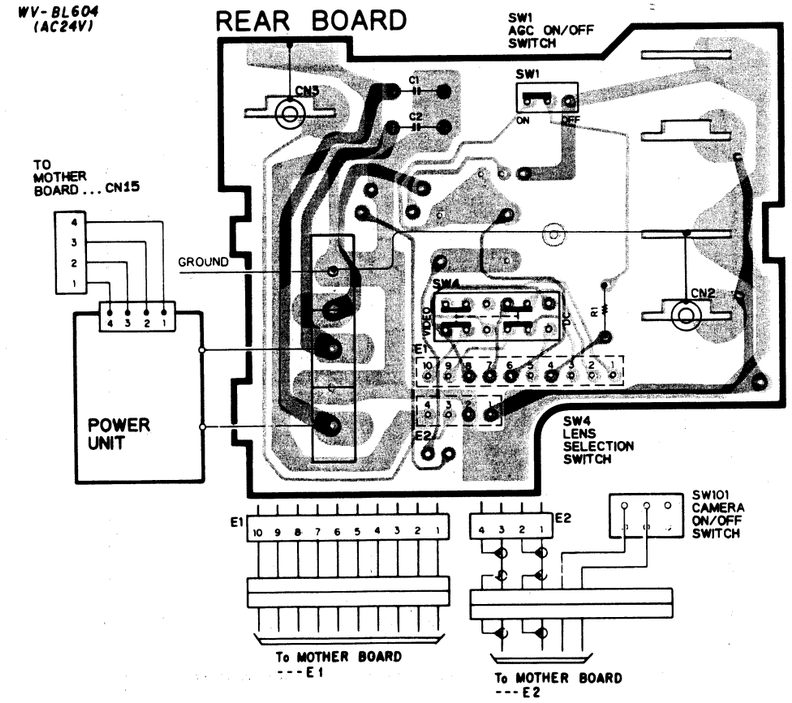


<ADDRESS INFORMATION>

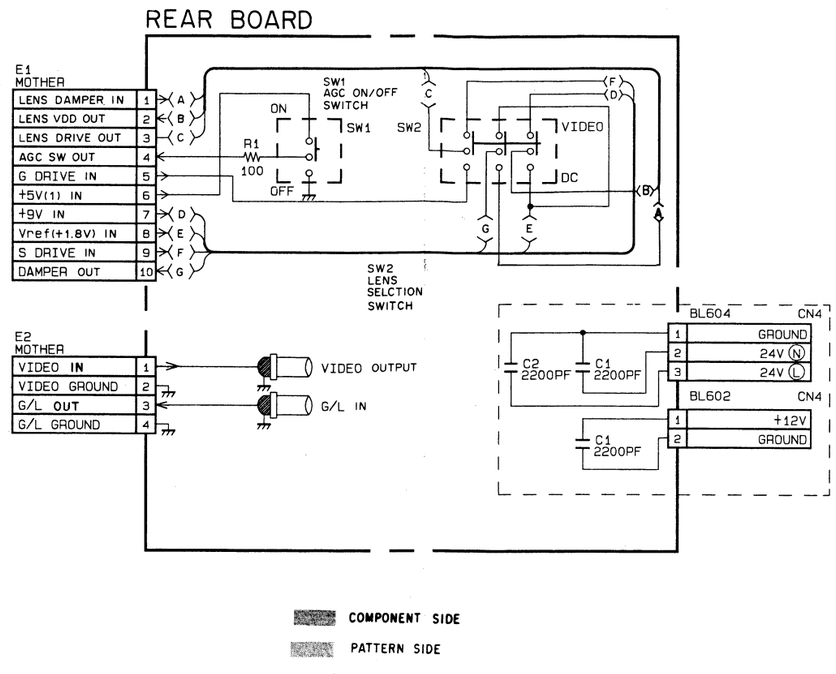
REF No.	Address
Q1	B2
D1	B2
D2	B2
D3	B3
D4	B2
D6	A3

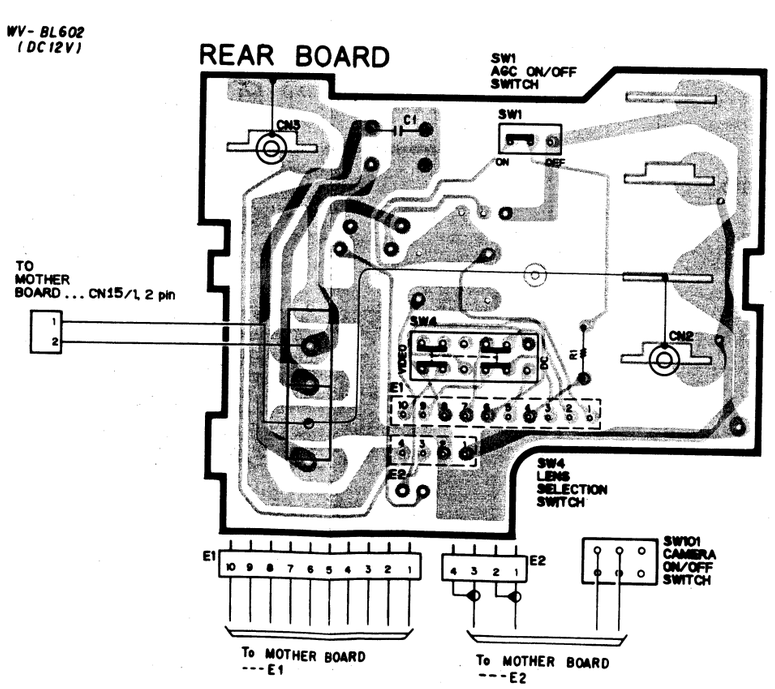
CONDUCTOR VIEW OF REAR BOARD



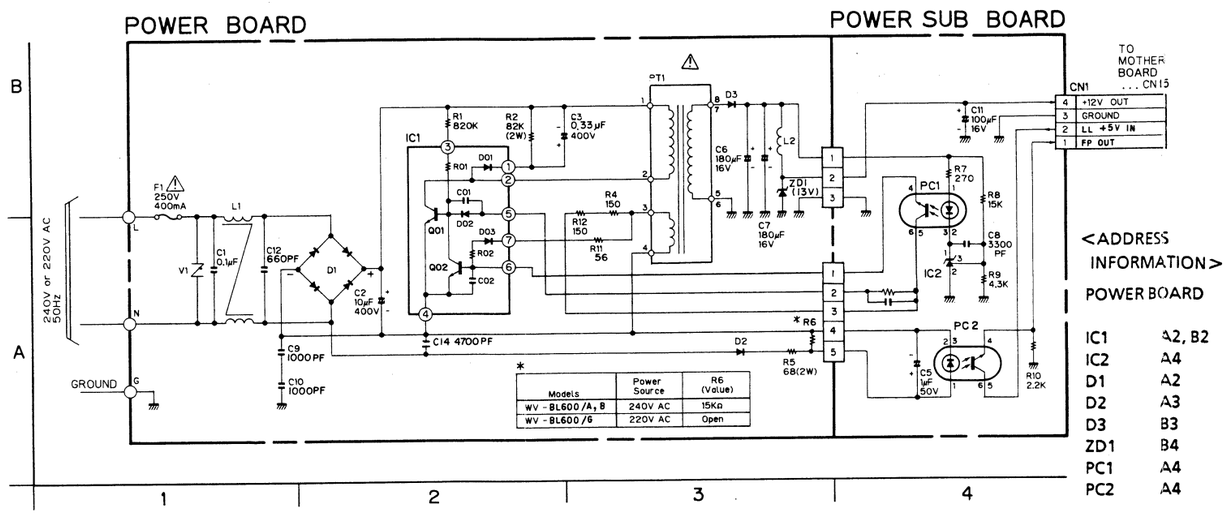


SCHEMATIC DIAGRAM OF REAR BOARD

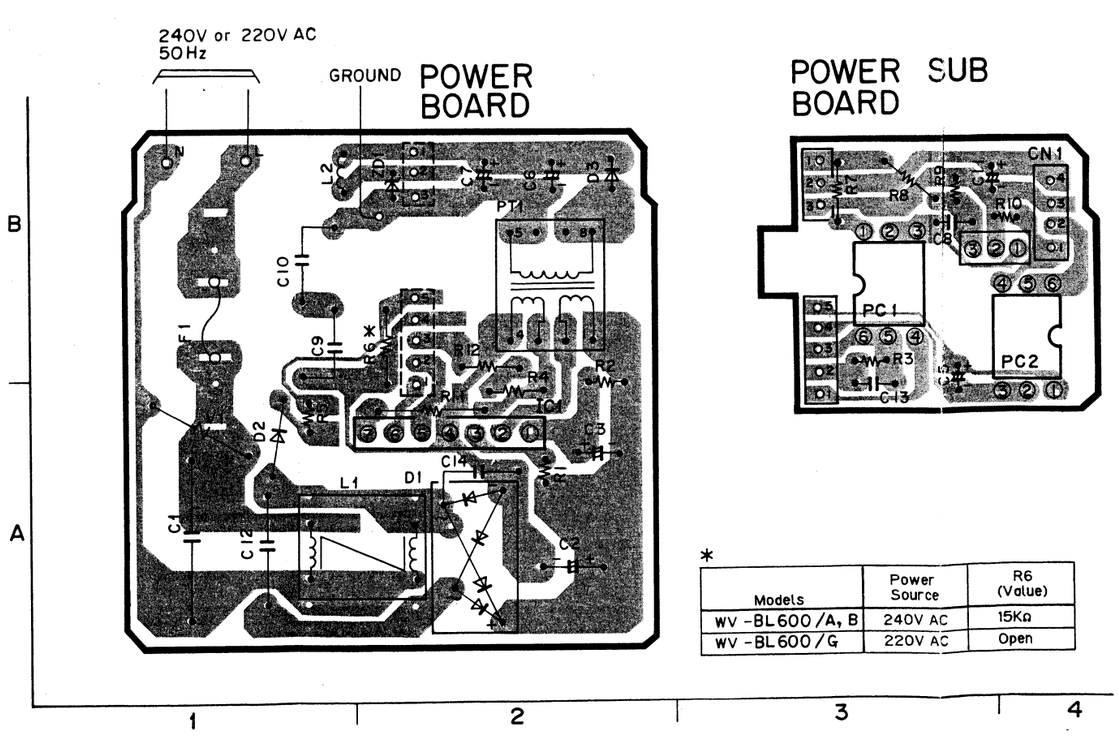




SCHEMATIC DIAGRAM OF POWER BOARD (WV-BL600)



CONDUCTOR VIEW OF POWER BOARD (WV-BL600)


240V or 220V AC 50Hz
GROUND
POWER BOARD
POWER SUB BOARD
Models | Power Source | R6 (Value)
WV-BL600/A, B | 240V AC | 15Kα
WV-BL600/G | 220V AC | Open

<VOLTAGES>

Power Board
WV-BL600(AC220V)

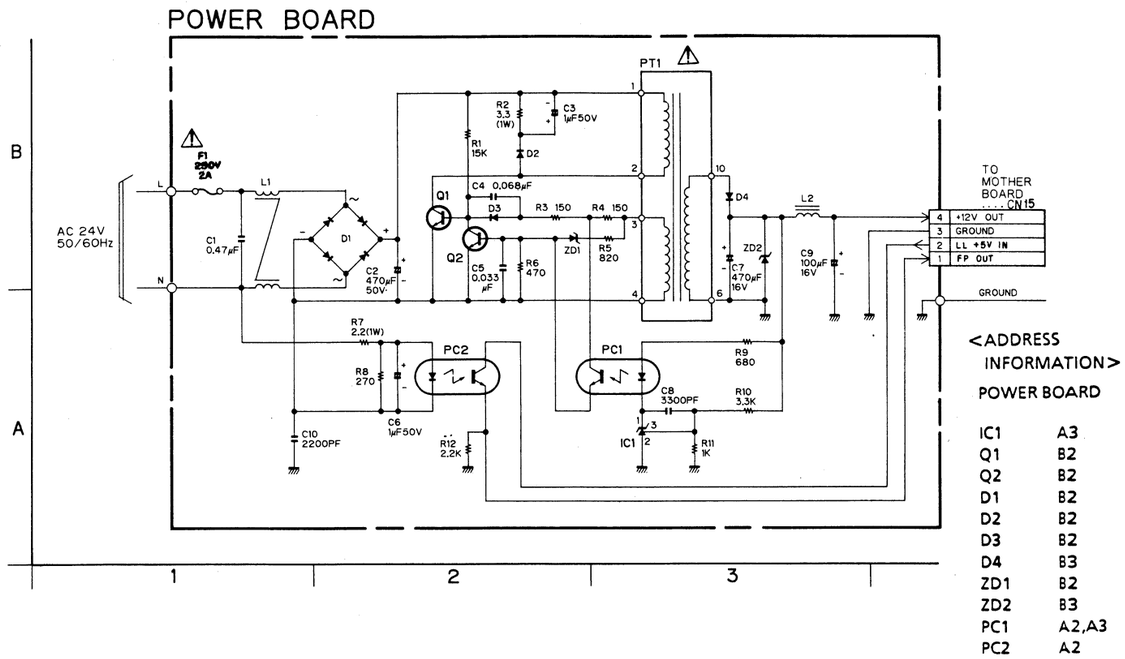
	IC1	IC2
Pin 1	0.5	8.8
2	159.5	0
3	0.2	2.5
4	-0.2	
5	-0.2	
6	-0.1	
7	-0.1	

<ADDRESS INFORMATION>

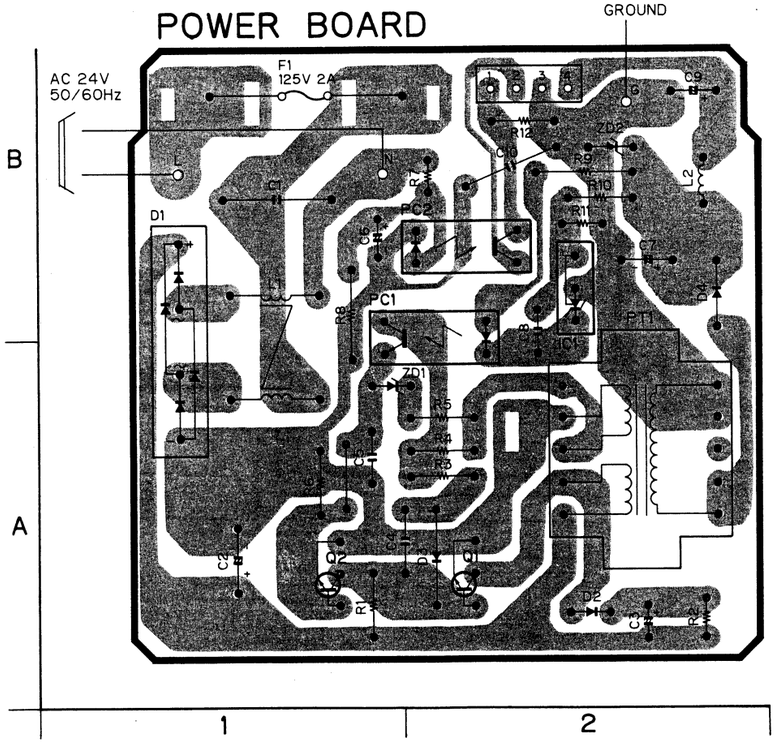
POWER BOARD

IC1 A2
IC2 B3
D1 A2
D2 A2
D3 B2
ZD1 B3
PC1 B3
PC2 B3

SCHEMATIC DIAGRAM OF POWER BOARD (WV-BL604)



CONDUCTOR VIEW OF POWER BOARD (WV-BL604)



<VOLTAGES>

Power Board
WV-BL604(AC24V)

	IC1
Pin 1	8.0
2	0
3	2.5

<ADDRESS INFORMATION>

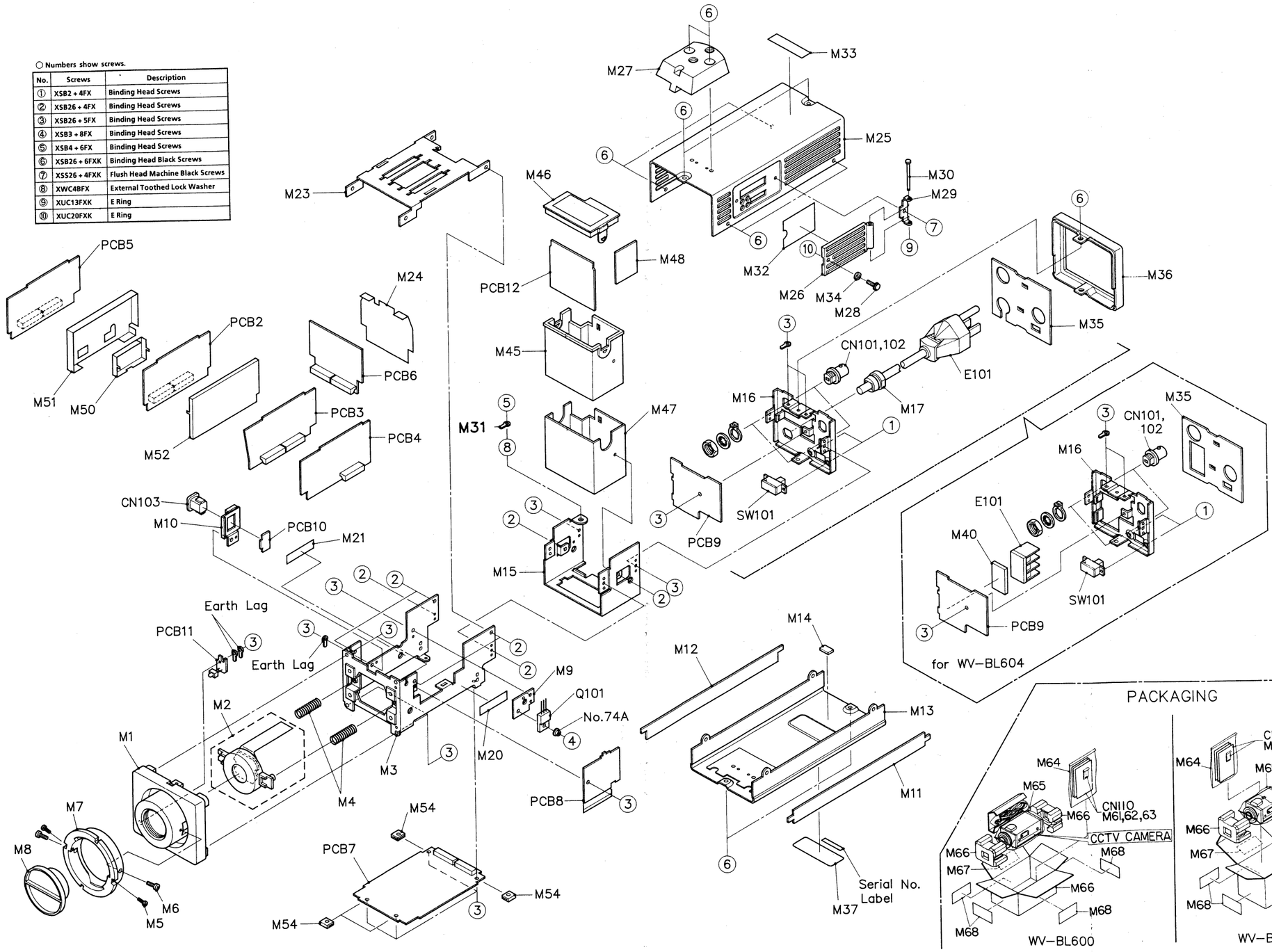
POWER BOARD

IC1 B2
Q1 A2
Q2 A1
D1 A1,B1
D2 A2
D3 A2
D4 B2
ZD1 A1,A2
ZD2 B2
PC1 A2, B2
PC2 B2

EXPRODED VIEW OF WV-BL600/604

○ Numbers show screws.

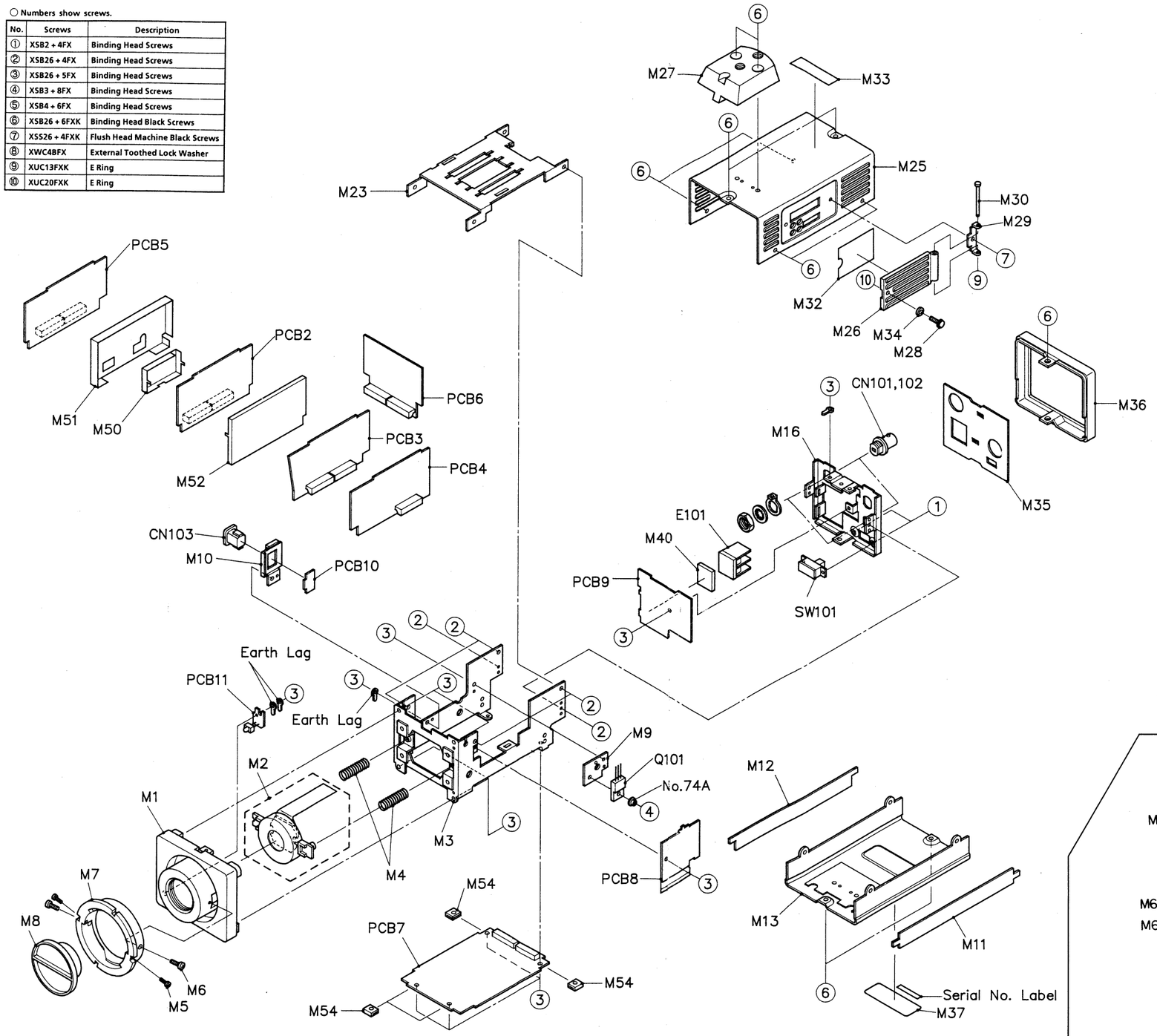
No.	Screws	Description
①	XSB2 + 4FX	Binding Head Screws
②	XSB26 + 4FX	Binding Head Screws
③	XSB26 + 5FX	Binding Head Screws
④	XSB3 + 8FX	Binding Head Screws
⑤	XSB4 + 6FX	Binding Head Screws
⑥	XSB26 + 6FXK	Binding Head Black Screws
⑦	XSS26 + 4FXK	Flush Head Machine Black Screws
⑧	XWC4BFX	External Toothed Lock Washer
⑨	XUC13FXK	E Ring
⑩	XUC20FXK	E Ring



EXPLODED VIEW OF WV-BL602

○ Numbers show screws.

No.	Screws	Description
①	XSB2 + 4FX	Binding Head Screws
②	XSB26 + 4FX	Binding Head Screws
③	XSB26 + 5FX	Binding Head Screws
④	XSB3 + 8FX	Binding Head Screws
⑤	XSB4 + 6FX	Binding Head Screws
⑥	XSB26 + 6FXK	Binding Head Black Screws
⑦	XSS26 + 4FXK	Flush Head Machine Black Screws
⑧	XWC4BFX	External Toothed Lock Washer
⑨	XUC13FXK	E Ring
⑩	XUC20FXK	E Ring



REPLACEMENT PARTS LIST

Important Notice

1. Components identified by "⚠" mark have special characteristics important for safety.
   When replacing any of these components, use only manufacturer's specified parts.
2. Printed circuit board assembly with mark (NLA) is no longer available after production discontinuation of the complete set.

REF.NO.	PART NO.	DESCRIPTION
CCTV CAMERA WV-BL600		
MISCELLANEOUS		
Q101	2SB941-PQR	Transistor
SW101	YFMFS201N	Slide Switch
E101 ⚠	YFKPGTSA25	AC Power Cord for WV-BL600/A
	HBS308A	AC Power Cord for WV-BL600/B
	YFVM030908A	AC Power Cord for WV-BL600/G
CN101,102	YWHXC0325900	BNC Connector
CN103	YFD4151N200	Auto Iris Lens Connector
M1	YWV5BA0060A2	Front Escutcheon
M2	YWV0EA0098AN	CCD Image Sensor Ass'y
M3	YWV2SA1480A2	Main Shassis
M4	YWV4JA0262A4	Spring for Bracket
M5	YWV1EA0127A4	Special Screw for FB Lock
M6	YWV1EA0128A4	Special Screw
M7	YWV3FA0101A3	Ring
M8	YWBC-2B	Cap
M9	YWV7DA0220A4	Heat Sink
M10	YWV2SA1314A4	Mounting Angle
M11	YWV5WA0990A4	Right Side Panel
M12	YWV5WA0991A4	Left Side Panel
M13	YWV5EA0746A2	Bottom Cover
M14	YFV2FA0122A4	Cushion
M15	YWV2SA1478A2	Mounting Angle for Power Unit
M16	YWV2KA0490A2	Rear Chassis
M17	YWSR6W1	Cord Clamp
M20	YWV7MA0270A4	Safety Label
M23	YWV2EA0132A3	Guide
M24	YWV2PA0343A4	Insulator
M25	YWV5EA0747A2	Cover
M26	YWV5EA0748A3	Cover
M27	YWV2TB0169A3	Mounting Bracket
M28	YWV1EA0158A4	Special Screw
M29	YWV2SA1479A4	Mounting Angle
M30	YWV4HA0128A4	Shaft
M31	YW-BCG-EM01	Earth Lag
M32	YWV7SA1011A4	Label
M33	YFV7MA0099A4	Safety Label
M34	YWV1KA0106A4	Washer
M35	YWV5WA0885A4	Panel
M36	YFV5BA0026A3	Escutcheon
M37 ⚠	YWV7QA2012A4	Main Label for WV-BL600/A
	YWV7QA2004A4	Main Label for WV-BL600/B
	YWV7QA2011A4	Main Label for WV-BL600/G
M38	YFV2NA0084A4	Spacer
M39	YFV2PA0207A4	Insulator
DRIVE BOARD		
PCB2 (NLA)	YWVKBBL60E1A	Printed Circuit Board Assy
IC1	NJM4560M	IC
IC2	YWTC4S71F	IC
IC3	MN3107CS	IC
IC4	MN5108	IC
IC5	MN53003LVM	IC
IC6	AN2011S	IC
IC7	YWTC4S71F	IC
Q1	XN4601	Transistor
Q2,3	XN6501	Transistor
Q4	2SD1819-QRS	Transistor
Q5	XN4601	Transistor
Q6	2SA1462	Transistor
Q7	2SC3938-QRS	Transistor
Q8	2SA1462	Transistor
Q9	2SC3938-QRS	Transistor
Q10	2SA1462	Transistor
Q11	2SC3938-QRS	Transistor
Q12	2SK198-Q	Transistor
Q13-15	2SC3931-CD	Transistor
D1-6	MA141K	Diode
D7,8	1SV153	Diode
D9-11	MA141K	Diode
R1	ERJ3GEYJ332	Carbon 3.3K ohms 1/16W
R2	ERJ3GEYJ363	Carbon 36K ohms 1/16W
R3	ERJ3GEYJ223	Carbon 22K ohms 1/16W
R4	ERJ3GEYJ751	Carbon 750 ohms 1/16W
R5,6	ERJ3GEYJ104	Carbon 100K ohms 1/16W
R7	ERJ3GEYJ162	Carbon 1.6K ohms 1/16W
R8	ERJ3GEYJ472	Carbon 4.7K ohms 1/16W
R9	ERJ3GEYJ104	Carbon 100K ohms 1/16W

REF.NO.	PART NO.	DESCRIPTION
R11	ERJ3GEYJ822	Carbon 8.2K ohms 1/16W
R13	ERJ3GEYJ113	Carbon 11K ohms 1/16W
R14,16	ERJ3GEYJ103	Carbon 10K ohms 1/16W
R27,28	ERJ3GEYJ102	Carbon 1K ohms 1/16W
R45,46	ERJ3GEYJ102	Carbon 1K ohms 1/16W
R47,48	ERJ3GEYJ103	Carbon 10K ohms 1/16W
R49	ERJ3GEYJ302	Carbon 3K ohms 1/16W
R50	ERJ3GEYJ752	Carbon 7.5K ohms 1/16W
R51	ERJ3GEYJ102	Carbon 1K ohms 1/16W
R52	ERJ3GEYJ221	Carbon 220 ohms 1/16W
R62	ERJ3GEYJ103	Carbon 10K ohms 1/16W
R63	ERJ3GEYJ153	Carbon 15K ohms 1/16W
R65	ERJ3GEYJ101	Carbon 100 ohms 1/16W
R72	ERJ3GEYJ751	Carbon 750 ohms 1/16W
R73	ERJ3GEYJ752	Carbon 7.5K ohms 1/16W
R74	ERJ3GEYJ203	Carbon 20K ohms 1/16W
R75	ERJ3GEYJ751	Carbon 750 ohms 1/16W
R76	ERJ3GEYJ203	Carbon 20K ohms 1/16W
R77	ERJ3GEYJ752	Carbon 7.5K ohms 1/16W
R78	YWR1220P333D	Metal 33K ohms
R79	YWR1220P163D	Metal 16K ohms
R80	YWR1220P183D	Metal 18K ohms
R81	YFR1220P113D	Metal 11K ohms
R89	ERJ3GEYJ392	Carbon 3.9K ohms 1/16W
R90	ERJ3GEYJ122	Carbon 1.2K ohms 1/16W
R91	ERJ3GEYJ392	Carbon 3.9K ohms 1/16W
R92	ERJ3GEYJ242	Carbon 2.4K ohms 1/16W
R93	ERJ3GEYJ561	Carbon 560 ohms 1/16W
R94,95	ERJ3GEYJ472	Carbon 4.7K ohms 1/16W
R96	ERJ3GEYJ622	Carbon 6.2K ohms 1/16W
R97	ERJ3GEYJ102	Carbon 1K ohms 1/16W
R98,100	ERJ3GEYJ203	Carbon 20K ohms 1/16W
R101	ERJ3GEYJ102	Carbon 1K ohms 1/16W
R102	ERJ3GEYJ105	Carbon 1M ohms 1/16W
R110,111	ERJ3GEYJ101	Carbon 100 ohms 1/16W
R112,113	ERJ3GEYJ102	Carbon 1K ohms 1/16W
R115	ERJ3GEYJ101	Carbon 100 ohms 1/16W
R120,121	ERJ3GEYJ303	Carbon 30K ohms 1/16W
R122	ERJ3GEYJ101	Carbon 100 ohms 1/16W
R201	ERJ8GCSG911	Carbon 910 ohms 1/8W
R202	ERJ8GCSG221	Carbon 220 ohms 1/8W
VR1	EVML1GA00BQ4	Variable Resistor 47K ohms
C1	ECEA1EKS220	Electrolytic 22 µF 25V
C2	ECEA1CKS470	Electrolytic 47 µF 16V
C3	ECEA0JS470	Electrolytic 47 µF 6.3V
C5	ECEA1AKS101	Electrolytic 100 µF 10V
C7	ECEA0JKS101	Electrolytic 100 µF 6.3V
C8	ECEA1CKS470	Electrolytic 47 µF 16V
C9	ECSF1AE226	Tantalum 22 µF 10V
C12,13	YW5CH150J5VB	Ceramic 15 pF

REF.NO.	PART NO.	DESCRIPTION
C14,15	ECSF1AE106	Tantalum 10 µF 10V
C20	ECST1CD336	Tantalum 33 µF 16V
C21	ECSF1VE106	Tanlum 10 µF 35V
C23-26	YF426104XKS	Ceramic 0.1 µF
C27	ECST1ED106ZR	Tantalum 10 µF 25V
C33	ECSF1AE106	Tantalum 10 µF 10V
C34	YW5F104Z2VB	Ceramic 0.1 µF
C35,37	YW5CH331J5VB	Ceramic 330 pF
C38	ECSF1AE106	Tantalum 10 µF 10V
C39	ECEA1HKK2R2	Electrolytic 2.2 µF 25V
C40	YW5X103K2VB	Ceramic 0.01 µF
C41,42	YW5CH180J5VB	Ceramic 18 pF
C43	ECSF1CE106	Tantalum 10 µF 16V
C44	ECEA1HKS0R1	Electrolytic 0.1 µF 50V
C45	YW5CH180J5VB	Ceramic 18 pF
C46	ECEA1AKK100	Electrolytic 10 µF 10V
C47	YW5X682K2VB	Ceramic 6800 pF
C48	ECSF1VE106	Tantalum 10 µF 35V
C49	ECST1CD106ZR	Tantalum 10 µF 16V
C50	ECSF1VE106	Tantalum 10 µF 35V
C51	YW5CH150J5VB	Ceramic 15 pF
C52	YW5CH060D5VB	Ceramic 6 pF
C53	YW5CH150J5VB	Ceramic 15 pF
C54	YW5CH120J5VB	Ceramic 12 pF
C55	YW5CH150J5VB	Ceramic 15 pF
C56	YW5CH150J5VB	Ceramic 15 pF
C57-59	ECSF1CE106	Tantalum 10 µF 16V
C60-62	YW5X103K2VB	Ceramic 0.01 µF
C63	ECEA1AKK100	Electrolytic 10 µF 10V
C64,65	YW5F104Z2VB	Ceramic 0.1 µF
C72	ECST1AB106	Tantalum 10 µF 10V
L2	YWNL328R2K	Coil 8.2 µH
L3	YFF3216E8R2K	Coil 8.2 µH
L4	YWNL328R2K	Coil 8.2 µH
L5	YFF3216E8R2K	Coil 8.2 µH
L6	YWNL328R2K	Coil 8.2 µH
L9	EIC5EB007A	Coil
J1,7	ERJ8GCS0R00	Jumper Resistor
J8,10	ERJ8GCS0R00	Jumper Resistor
J12,18	ERJ3GEY0R00	Jumper Resistor
J21,66	ERJ3GEY0R00	Jumper Resistor
J67-71	ERJ3GEY0R00	Jumper Resistor
J99,106	ERJ3GEY0R00	Jumper Resistor
J107-109	ERJ3GEY0R00	Jumper Resistor
J203-208	ERJ8GCS0R00	Jumper Resistor
CN3	YW530202410	Connector
CN4	YW530202610	Connector
M51	YWV2HA0750A4	Shield Cover A
M52	YWV2HA0751A4	Shield Cover B
M53	YWV2HA0752A3	ShieldCover C

PROCESS BOARD

REF.NO.	PART NO.	DESCRIPTION	
PCB3 (NLA)	YWVKCBL60E1A	Printed Circuit Board Assy	
IC1	YWTC4S69F	IC	
IC2,3	MN6287S	IC	
IC4	YWTC4S81FR	IC	
IC5	AN2050FB	IC	
IC7	YWD65012B512	IC	
IC8	TC40H000F	IC	
IC9	MN4053BS	IC	
IC10	MN676021PDS	IC	
IC11	-NJM2107	IC	
Q1	2SD1819-QRS	Transistor	
Q2	2SC3931-CD	Transistor	
Q3	2SK662-PQR	FET	
Q4,5	XN6501	Transistor	
Q7	2SD1819-QRS	Transistor	
Q8,9	2SB1218-QRS	Transistor	
Q10,11	2SD1819-QRS	Transistor	
Q12-14	2SB1218-QRS	Transistor	
Q15	2SC3931-CD	Transistor	
Q16,17	2SK662-PQR	FET	
Q18	2SD1819-QRS	Transistor	
Q19	2SB1218-QRS	Transistor	
Q21,22	UN5211	Transistor	
Q23	2SK662-PQR	FET	
D1,2	1SV153	Diode	
R1	ERJ3GEYJ103	Carbon	10K ohms 1/16W
R2	ERJ3GEYJ622	Carbon	6.2K ohms 1/16W
R3	ERJ3GEYJ103	Carbon	10K ohms 1/16W
R4	ERJ3GEYJ162	Carbon	1.6K ohms 1/16W
R5	ERJ3GEYJ122	Carbon	1.2K ohms 1/16W
R6	ERJ3GEYJ163	Carbon	16K ohms 1/16W
R7	ERJ3GEYJ162	Carbon	1.6K ohms 1/16W
R8,9	ERJ3GEYJ122	Carbon	1.2K ohms 1/16W
R10	ERJ3GEYJ562	Carbon	5.6K ohms 1/16W
R12	YWR1220P241D	Metal	240 ohms
R13,14	ERJ3GEYJ102	Carbon	1K ohms 1/16W
R15	ERJ3GEYJ122	Carbon	1.2K ohms 1/16W
R16	ERJ3GEYJ102	Carbon	1K ohms 1/16W
R17	ERJ3GEYJ562	Carbon	5.6K ohms 1/16W
R18	ERJ3GEYJ102	Carbon	1K ohms 1/16W
R19	ERJ3GEYJ222	Carbon	2.2K ohms 1/16W
R20	ERJ3GEYJ822	Carbon	8.2K ohms 1/16W
R21	ERJ3GEYJ332	Carbon	3.3K ohms 1/16W
R22	R1220P821D	Metal	820 ohms
R23	ERJ3GEYJ222	Carbon	2.2K ohms 1/16W
R24	ERJ3GEYJ182	Carbon	1.8K ohms 1/16W
R25	ERJ3GEYJ184	Carbon	180K ohms 1/16W
R26	ERJ3GEYJ433	Carbon	43K ohms 1/16W
R27	ERJ3GEYJ334	Carbon	330K 1/16W
R28	ERJ3GEYJ124	Carbon	120K ohms 1/16W
R29	ERJ3GEYJ104	Carbon	100K ohms 1/16W

REF.NO.	PART NO.	DESCRIPTION	
R31	YW2116685GT	Carbon	6.8M ohms
R32	ERJ3GEYJ102	Carbon	1K ohms 1/16W
R33	ERJ3GEYJ154	Carbon	150K ohms 1/16W
R34	ERJ3GEYJ182	Carbon	1.8K ohms 1/16W
R35	ERJ3GEYJ222	Carbon	2.2K ohms 1/16W
R36,37	ERJ3GEYJ154	Carbon	150K ohms 1/16W
R38	ERJ3GEYJ333	Carbon	33K ohms 1/16W
R39	ERJ3GEYJ562	Carbon	5.6K ohms 1/16W
R40	ERJ3GEYJ104	Carbon	100K ohms 1/16W
R41	ERJ3GEYJ203	Carbon	20K ohms 1/16W
R42	ERJ3GEYJ222	Carbon	2.2K ohms 1/16W
R43	ERJ3GEYJ103	Carbon	10K ohms 1/16W
R44	ERJ3GEYJ102	Carbon	1K ohms 1/16W
R45	ERJ3GEYJ912	Carbon	9.1K ohms 1/16W
R46	ERJ3GEYJ242	Carbon	2.4K ohms 1/16W
R47,48	ERJ3GEYJ222	Carbon	2.2K ohms 1/16W
R49	ERJ3GEYJ202	Carbon	2K ohms 1/16W
R50	ERJ3GEYJ391	Carbon	390 ohms 1/16W
R51	ERJ3GEYJ103	Carbon	10K ohms 1/16W
R53	ERJ3GEYJ333	Carbon	33K ohms 1/16W
R56	ERJ3GEYJ103	Carbon	10K ohms 1/16W
R58	ERJ3GEYJ123	Carbon	12K ohms 1/16W
R59	ERJ3GEYJ100	Carbon	10 ohms 1/16W
R60	ERJ3GEYJ104	Carbon	100K ohms 1/16W
R61,62	ERJ3GEYJ562	Carbon	5.6K ohms 1/16W
R63	ERJ3GEYJ472	Carbon	4.7K ohms 1/16W
R64	ERJ3GEYJ562	Carbon	5.6K ohms 1/16W
R66,68	ERJ3GEYJ102	Carbon	1K ohms 1/16W
R69	ERJ3GEYJ121	Carbon	120 ohms 1/16W
R70,71	ERJ3GEYJ102	Carbon	1K ohms 1/16W
R72,73	ERJ3GEYJ103	Carbon	10K ohms 1/16W
R75	ERJ3GEYJ105	Carbon	1M ohms 1/16W
R76	ERJ3GEYJ221	Carbon	220 ohms 1/16W
R77	ERJ3GEYJ105	Carbon	1M ohms 1/16W
R79	ERJ3GEYJ203	Carbon	20K ohms 1/16W
R80	ERJ3GEYJ362	Carbon	3.6K ohms 1/16W
R81	ERJ3GEYJ392	Carbon	3.9K ohms 1/16W
R82	ERJ3GEYJ225	Carbon	2.2M ohms 1/16W
R83	ERJ3GEYJ823	Carbon	82K ohms 1/16W
R84	ERJ3GEYJ392	Carbon	3.9K ohms 1/16W
R85	ERJ3GEYJ221	Carbon	220 ohms 1/16W
R86,87	ERJ3GEYJ561	Carbon	560 ohms 1/16W
R89-91	ERJ3GEYJ561	Carbon	560 ohms 1/16W
R92-97	ERJ3GEYJ562	Carbon	5.6K ohms 1/16W
R98,104	ERJ3GEYJ103	Carbon	10K ohms 1/16W
R105,106	ERJ3GEYJ103	Carbon	10K ohms 1/16W
R108	ERJ3GEYJ102	Carbon	1K ohms 1/16W
R109	ERJ3GEYJ622	Carbon	6.2K ohms 1/16W
R110	ERJ3GEYJ562	Carbon	5.6K ohms 1/16W
R112	ERJ3GEYJ103	Carbon	10K ohms 1/16W
R113	ERJ3GEYJ473	Carbon	47K ohms 1/16W
R116	ERJ3GEYJ561	Carbon	560 ohms 1/16W
R117	ERJ3GEYJ101	Carbon	100 ohms 1/16W
R118	YWR1220P472D	Metal	4.7K ohms
R119	YWR1220P103D	Metal	10K ohms

REF.NO.	PART NO.	DESCRIPTION
VR1,2	EVM13SW00B14	Variable Resistor 10K ohms
VR3	EVM13SW00B15	Variable Resistor 100K ohms
VR5-7	EVM13SW00B14	Variable Resistor 10K ohms
C2	ECSF1AE225	Tantalum 2.2 µF 10V
C4	ECEA1AKK100	Electrolytic 10 µF 10V
C7	ECEA1AS470	Electrolytic 47 µF 10V
C8	ECSF1VE334	Tantalum 0.33 µF 35V
C9	ECEA1AKK100	Electrolytic 10 µF 6.3V
C10	YW5F104Z2VB	Ceramic 0.1 µF
C11	ECEA1HS4R7	Electrolytic 4.7 µF 50V
C12	ECEA0GKS470	Electrolytic 47 µF 4V
C13	YW5X222K5VB	Ceramic 2200 pF
C14	YW5F104Z2VB	Ceramic 0.1 µF
C15	ECEA1AS470	Electrolytic 47 µF 10V
C16	ECEA1HKS0R1	Electrolytic 0.1 µF 50V
C17	YW5F104Z2VB	Ceramic 0.1 µF
C18	YW5F473Z2VB	Ceramic 0.047 µF
C19-22	YW5F104Z2VB	Ceramic 0.1 µF
C23	ECEA0GKS470	Electrolytic 47 µF 4V
C24	YW5F104Z2VB	Ceramic 0.1 µF
C25	ECEA1AS470	Electrolytic 47 µF 10V
C26	YW5F104Z2VB	Ceramic 0.1 µF
C27	ECEA1AS470	Electrolytic 47 µF 10V
C28-30	YW5F104Z2VB	Ceramic 0.1 µF
C34	YW5CH101J5VB	Ceramic 100 pF
C35	ECEA1HKS010	Electrolytic 1 µF 50V
C36	ECSF1AE106	Tantalum 10 µF 10V
C37	YW5CH101J5VB	Ceramic 100 pF
C38	ECSF1AE225	Tantalum 2.2 µF 10V
C41	ECSF1CE106	Tantalum 10 µF 16V
C43	YW5CH470J5VB	Ceramic 47 pF
C44	YW5CH121J5VB	Ceramic 120 pF
C45,46	YF400331CHJT	Ceramic 330 pF
C49	ECSF1CE106	Electrolytic 10 µF 16V
C51	YW5CH150J5VB	Ceramic 15 pF
C52	YW5CH220J5VB	Ceramic 22 pF
C53	YW5F104Z2VB	Ceramic 0.1 µF
C54	ECSF1CE105	Tantalum 1 µF 16V
C55	YF400103XKT	Ceramic 0.01 µF
C56	ECSF1CE225	Tantalum 2.2 µF 16V
C57	YF400103XKT	Ceramic 0.01 µF
C58	ECSF1AE106	Electrolytic 10 µF 10V
C59	YW5CH820J5VB	Ceramic 82 pF
C60	ECSF1AE106	Tantalum 10 µF 10V
C67	YW5F104Z2VB	Ceramic 0.1 µF
C68	YW5F333Z2VB	Ceramic 0.033 µF
C69	ECEA0GKS470	Electrolytic 47 µF 4V
C70,71	YW5F104Z2VB	Ceramic 0.1 µF
C72	ECEA0GKN101	Electrolytic 100 µF 4V
CT1	ECRJA020E11	Trimmer Capacitor

REF.NO.	PART NO.	DESCRIPTION
L1	YFF3216A2R2K	Coil 2.2 µH
L3	YWNL322R2K	Coil 2.2 µH
L4	YFF3216E8R2K	Coil 8.2 µH
L5,6	YFF3216A2R2K	Coil 2.2 µH
L7-9	YFF3216E8R2K	Coil 8.2 µH
L10	YWF050440	Coil
X1	YWHC49US0440	Crystal Oscillator
CF1	ELB4C026	Filter
CF2	ELB5B008	Filter
CF3	ELB4B016	Filter
J4,6	ERJ3GEY0R00	Jumper Resistor
J10,13	ERJ3GEY0R00	Jumper Resistor
J14,16	ERJ3GEY0R00	Jumper Resistor
J17,18	ERJ3GEY0R00	Jumper Resistor
J52	ERJ3GEY0R00	Jumper Resistor
J74,78	ERJ3GEY0R00	Jumper Resistor
J88	ERJ3GEY0R00	Jumper Resistor
J107,115	ERJ3GEY0R00	Jumper Resistor
CN1	YW530202610	26-pin Connector
CN2	YW530202410	24-pin Connector

MEMORY BOARD

PCB4 (NLA)	YWVKYBL60E2A	Printed Circuit Board Assy
IC1	YWCXD1172M	IC
IC2	MN74HC174MS	IC
IC3	MN4053BS	IC
IC4	YWTC4S66FR	IC
IC5	MN4013BS	IC
IC6	NJM3414M	IC
IC7	YWTC7S00FR	IC
IC8	YWTC4S69F	IC
IC9	-MN53015LVO2	IC
IC10,11	YWM5M4C500L	IC
Q1	2SB1218-QRS	Transistor
Q2	2SD1819-QRS	Transistor
Q3	2SC3931-CD	Transistor
Q4	2SD1819-QRS	Transistor
Q5	2SC3931-CD	Transistor
Q8	2SD1819-QRS	Transistor
Q9	2SC3931-CD	Transistor
Q10	2SB1218-QRS	Transistor
Q11	2SD1819-QRS	Transistor
Q12	2SK662-PQR	FET
Q13	2SD1819-QRS	Transistor
D1,2	1SV153	Diode
R1	ERJ3GEYJ222	Carbon 2.2K ohms1 /16W
R2,3	ERJ3GEYJ101	Carbon 100 ohms1/16W
R4,5	ERJ3GEYJ222	Carbon 2.2K ohms1 /16W
R6	ERJ3GEYJ362	Carbon 3.6K ohms1 /16W
R7	ERJ3GEYJ101	Carbon 100 ohms1/16W
R8	ERJ3GEYJ152	Carbon 1.5K ohms1 /16W
R9	ERJ3GEYJ222	Carbon 2.2K ohms1 /16W

REF.NO.	PART NO.	DESCRIPTION	
R13	ERJ3GEYJ301	Carbon	300 ohms 1/16W
R14	ERJ3GEYJ100	Carbon	10 ohms 1/16W
R15	ERJ3GEYJ332	Carbon	3.3K ohms 1/16W
R16	ERJ3GEYJ103	Carbon	10K ohms 1/16W
R17	ERJ3GEYJ222	Carbon	2.2K ohms 1/16W
R18	ERJ3GEYJ102	Carbon	1K ohms 1/16W
R19	ERJ3GEYJ202	Carbon	2K ohms 1/16W
R20	YWR1220P103D	Metal	10K ohms
R22	R1220P822D	Metal	8.2K ohms
R24	YF2116470JT	Carbon	47 ohms 1/16W
R26	ERJ3GEYJ123	Carbon	12K ohms 1/16W
R27	ERJ3GEYJ102	Carbon	1K ohms 1/16W
R28	ERJ3GEYJ332	Carbon	3.3K ohms 1/16W
R29,30	ERJ3GEYJ103	Carbon	10K ohms 1/16W
R31,32	ERJ3GEYJ102	Carbon	1K ohms 1/16W
R33	ERJ3GEYJ153	Carbon	15K ohms 1/16W
R35	ERJ3GEYJ105	Carbon	1M ohms 1/16W
R36,37	ERJ3GEYJ102	Carbon	1K ohms 1/16W
R40	ERJ3GEYJ103	Carbon	10K ohms 1/16W
R41	ERJ3GEYJ202	Carbon	2K ohms 1/16W
R42,43	ERJ3GEYJ101	Carbon	100 ohms 1/16W
R44	ERJ3GEYJ391	Carbon	390 ohms 1/16W
R125,129	ERJ3GEYJ101	Carbon	100 ohms 1/16W
R139-141	ERJ3GEYJ101	Carbon	100 ohms 1/16W
R143,144	ERJ3GEYJ101	Carbon	100 ohms 1/16W
R152	ERJ3GEYJ470	Carbon	47 ohms 1/16W
Z1	EXBM16D6GLG	Block Resistor	
C1	ECST1CC106ZR	Tantalum	10 µF 16V
C2,3	YW5F104Z2VB	Ceramic	0.1 µF
C4	ECST0JB106ZR	Tantalum	10 µF 6.3V
C5	YW5CH101J5VB	Ceramic	100 PF
C6,8	ECST1CC106ZR	Tantalum	10 µF16V
C9	ECST1CC106ZR	Tantalum	10 µF16V
C10	YW5F104Z2VB	Ceramic	0.1 µF
C11	ECST1CC106ZR	Tantalum	10 µF16V
C13	ECST0JB106ZR	Tantalum	10 µF 6.3V
C14,15	YW5F104Z2VB	Ceramic	0.1 µF
C16	YW5CH101J5VB	Ceramic	100 PF
C17	ECST1CC106ZR	Tantalum	10 µF16V
C18,22	YW5F104Z2VB	Ceramic	0.1 µF
C24	YF400153XKT	Ceramic	0.015 µF
C25	YW5X272K5VB	Ceramic	2700 pF
C26	ECST1AC106ZR	Tantalum	10 µF 10V
C27,28	YF400331CHJT	Ceramic	330 PF
C29	YW5F104Z2VB	Ceramic	0.1 µF
C30	ECST1CC106ZR	Tantalum	10 µF 16V
C32	YW5CH330J5VB	Ceramic	33 PF
C33	ECSF1CE106	Tantalum	10 µF 16V
C101,102	YW5F104Z2VB	Ceramic	0.1 µF
C103	ECST0JB106ZR	Tantalum	10 µF 6.3V

REF.NO.	PART NO.	DESCRIPTION	
C106,107	YW5F104Z2VB	Ceramic	0.1 µF
L1,3	YWNL322R2K	Coil	2.2 µH
L4	YWNL322R2K	Coil	2.2 µH
L5	YWS5LD30449	Coil	
L6	YFF3216A2R2K	Coil	2.2 µH
CF1	ELB5B033	Filter	
J1	ERJ3GEY0R00	Jumper Resistor	
J2	ERJ8GCS0R00	Jumper Resistor	
J3-7	ERJ3GEY0R00	Jumper Resistor	
J7	ERJ8GCS0R00	Jumper Resistor	
J8	ERJ3GEY0R00	Jumper Resistor	
	ERJ8GCS0R00	Jumper Resistor	
J9	ERJ3GEY0R00	Jumper Resistor	
	ERJ8GCS0R00	Jumper Resistor	
J10	ERJ3GEY0R00	Jumper Resistor	
	ERJ8GCS0R00	Jumper Resistor	
J11	ERJ3GEY0R00	Jumper Resistor	
	ERJ8GCS0R00	Jumper Resistor	
J12-19	ERJ3GEY0R00	Jumper Resistor	
J21,34	ERJ3GEY0R00	Jumper Resistor	
J101-124	ERJ3GEY0R00	Jumper Resistor	
J127,128	ERJ3GEY0R00	Jumper Resistor	
J130-138	ERJ3GEY0R00	Jumper Resistor	
J142,145	ERJ3GEY0R00	Jumper Resistor	
J146-151	ERJ3GEY0R00	Jumper Resistor	
CN1	YW530202410	24-pin Connector	

INTERFACE BOARD

PCB5 (NLA)	YWVKYBL60P3A	Printed Circuit Board Assy
IC1	NJM2904M	IC
IC2	NJM3414M	IC
IC3	YWM5236L	IC
IC4	MN4538BS	IC
IC5	MN6287S	IC
IC6	YWTC4S69F	IC
IC7	NJM2903M	IC
Q1	2SD1820-QRS	Transistor
Q2	2SC3303-0Y	Transistor
Q3	2SB766-RS	Transistor
Q4	2SD874-RS	Transistor
Q6	2SD1819-QRS	Transistor
Q7	2SC3931-CD	Transistor
Q8	2SD1819-QRS	Transistor
Q9	XN4601	Transistor
Q10	2SD601-RS	Transistor
Q11	2SB709-QRS	Transistor
Q12	2SB1218-QRS	Transistor
Q13	2SD1819-QRS	Transistor

REF.NO.	PART NO.	DESCRIPTION	
Q14	2SC3931-CD	Transistor	
Q15	2SB1218-QRS	Transistor	
Q16	2SD1819-QRS	Transistor	
Q18	2SB1218-QRS	Transistor	
Q19	XN4601	Transistor	
Q20	2SC3931-CD	Transistor	
Q21	2SB1218-QRS	Transistor	
Q24	2SD874-RS	Transistor	
Q25	XN4501	Transistor	
Q26	2SD1030RST	Transistor	
Q27	2SB1218-QRS	Transistor	
Q28	2SK198-Q	FET	
Q29	2SD1819-QRS	Transistor	
D1	SS1.5J4	Diode	
D2	MA159	Diode	
D3	ERA22-06	Diode	
D4	MA3200-M	Diode	
D5,6	ERA22-06	Diode	
D7	MA3110-M	Diode	
D8,9	MA143	Diode	
D10	MA151K	Diode	
R1	ERJ3GEYJ221	Carbon	220 ohms 1/16W
R2	ERJ3GEYJ471	Carbon	470 ohms 1/16W
R3	ERJ3GEYJ153	Carbon	15K ohms 1/16W
R4	YWR1220P753D	Metal	75K ohms
R5	YWR1220P103D	Metal	10K ohms
R6	ERJ3GEYJ511	Carbon	510 ohms 1/16W
R7	ERJ3GEYJ202	Carbon	2K ohms 1/16W
R8	ERJ3GEYJ332	Carbon	3.3K ohms 1/16W
R9	ERJ3GEYJ151	Carbon	150 ohms 1/16W
R10	R1220P432D	Metal	4.3K ohms
R11	YWR1220P472D	Metal	4.7K ohms
R12	ERJ3GEYJ302	Carbon	3K ohms 1/16W
R13	YWR1220P102D	Metal	1K ohms
R14	YWR1220P273D	Metal	27K ohms
R15	YF2116470JT	Carbon	47 ohms 1/16W
R16	ERJ3GEYJ331	Carbon	330 ohms 1/16W
R17	ERJ3GEYJ102	Carbon	1K ohms 1/16W
R18	YWR1220P302D	Metal	3K ohms
R19	YWR1220P182D	Metal	1.8K ohms
R21	YWR1220P302D	Metal	3K ohms
R22	YWR1220P182D	Metal	1.8K ohms
R23	YF2116470JT	Carbon	47 ohms 1/16W
R26	ERJ3GEYJ101	Carbon	100 ohms 1/16W
R27	ERJ3GEYJ471	Carbon	470 ohms 1/16W
R28	ERSA18J391	Solid Resistor	390 ohms
R29	ERJ3GEYJ102	Carbon	1K ohms 1/16W
R30	ERJ3GEYJ222	Carbon	2.2K ohms 1/16W
R31	ERJ3GEYJ151	Carbon	150 ohms 1/16W
R32	ERJ3GEYJ163	Carbon	16K ohms 1/16W
R33	ERJ3GEYJ332	Carbon	3.3K ohms 1/16W
R34	ERJ3GEYJ102	Carbon	1K ohms 1/16W
R35	ERJ3GEYJ270	Carbon	27 ohms 1/6W
R36	ERJ3GEYJ332	Carbon	3.3K ohms 1/16W
R37,38	ERJ3GEYJ222	Carbon	2.2K ohms 1/16W

REF.NO.	PART NO.	DESCRIPTION	
R39,40	YF21162R2JT	Carbon	2.2 ohms 1/16W
R41	YWR1220P332D	Metal	3.3K ohms
R42	R1220P123D	Metal	12K ohms
R43	ERJ3GEYJ472	Carbon	4.7K ohms 1/16W
R44	ERJ3GEYJ332	Carbon	3.3K ohms 1/16W
R45	ERJ3GEYJ392	Carbon	3.9K ohms 1/16W
R46	ERJ3GEYJ332	Carbon	3.3K ohms 1/16W
R47	ERJ3GEYJ392	Carbon	3.9K ohms 1/16W
R48	ERJ3GEYJ620	Carbon	62 ohms 1/16W
R49	ERJ3GEYJ102	Carbon	1K ohms 1/16W
R50	ERJ3GEYJ392	Carbon	3.9K ohms 1/16W
R51	ERJ3GEYJ472	Carbon	4.7K ohms 1/16W
R52	ERJ3GEYJ100	Carbon	10 ohms 1/16W
R53	ERJ3GEYJ472	Carbon	4.7K ohms 1/16W
R54	ERJ3GEYJ103	Carbon	10K ohms 1/16W
R55	ERJ3GEYJ332	Carbon	3.3K ohms 1/16W
R56	ERJ3GEYJ222	Carbon	2.2K ohms 1/16W
R57	ERJ3GEYJ103	Carbon	10K ohms 1/16W
R58	ERJ3GEYJ101	Carbon	100 ohms 1/16W
R60	ERJ3GEYJ471	Carbon	470 ohms 1/16W
R62	ERJ3GEYJ332	Carbon	3.3K ohms 1/16W
R63	ERJ3GEYJ183	Carbon	18K ohms 1/16W
R66	ERJ3GEYJ622	Carbon	6.2K ohms 1/16W
R67	ERJ3GEYJ151	Carbon	150 ohms 1/16W
R68	ERJ3GEYJ272	Carbon	2.7K ohms 1/16W
R69	ERJ3GEYJ472	Carbon	4.7K ohms 1/16W
R70	ERJ3GEYJ822	Carbon	8.2K ohms 1/16W
R71,72	ERJ3GEYJ472	Carbon	4.7K ohms 1/16W
R73	ERJ3GEYJ101	Carbon	100 ohms 1/16W
R74	ERJ3GEYJ472	Carbon	4.7K ohms 1/16W
R75	ERJ3GEYJ152	Carbon	1.5K ohms 1/16W
R76	ERJ3GEYJ332	Carbon	3.3K ohms 1/16W
R77	ERJ3GEYJ103	Carbon	10K ohms 1/16W
R78	YWR1220P153D	Metal	15K ohms
R80	ERJ3GEYJ822	Carbon	8.2K ohms 1/16W
R97	ERJ3GEYJ102	Carbon	1K ohms 1/16W
R98	ERJ3GEYJ332	Carbon	3.3K ohms 1/16W
R99	ERJ3GEYJ103	Carbon	10K ohms 1/16W
R100	ERJ3GEYJ473	Carbon	47K ohms 1/16W
R101	ERJ3GEYJ103	Carbon	10K ohms 1/16W
R102	ERJ3GEYJ621	Carbon	620 ohms 1/16W
R103	ERJ3GEYJ332	Carbon	3.3K ohms 1/16W
R104	ERJ3GEYJ563	Carbon	56K ohms 1/16W
R105-108	ERJ3GEYJ101	Carbon	100 ohms 1/16W
R109	ERJ3GEYJ472	Carbon	4.7K ohms 1/16W
R110	ERJ3GEYJ101	Carbon	100 ohms 1/16W
R111	ERJ3GEYJ103	Carbon	10K ohms 1/16W
VR1	EVM13SW00B53	Variable Resistor	5K ohms
VR2	EVM13SW00B14	Variable Resistor	10K ohms
C1	ECEA1EU101	Electrolytic	100 µF 25V

REF.NO.	PART NO.	DESCRIPTION
C2	ECQM1H104KZ	Plastic 0.1 µF
C3	ECEA1CU101	Electrolytic 100 µF 16V
C4	ECST1ED106ZR	Tantalum 10 µF 25V
C5	YW5F104Z2VB	Ceramic 0.1 µF
C6	YW5X102K5VB	Ceramic 1000 pF
C7	ECSF1HE225	Tantalum 2.2 µF 50V
C8	ECST1ED106ZR	Tantalum 10 µF 25V
C9	ECEA1AFS221	Electrolytic 220 µF 10V
C10	YF400A272XKT	Ceramic 2700 pF
C11	ECEA1EU101	Electrolytic 100 µF 25V
C12	ECEA1AU221	Electrolytic 220 µF 10V
C13	ECEA1EU470	Electrolytic 47 µF 25V
C14	ECEA1AU101	Electrolytic 100 µF 10V
C15	ECEA1CU101	Electrolytic 100 µF 16V
C16	ECEA1AU470	Electrolytic 47 µF 10V
C17	ECST1AD476ZR	Tantalum 47 µF 10V
C18	ECEA1AU470	Electrolytic 47 µF 10V
C19	YW5F104Z2VB	Ceramic 0.1 µF
C20	ECEA0JU470	Electrolytic 47 µF 6.3V(SU)
C21	YW5X103K2VB	Ceramic 0.01 µF
C23	ECEA1CU470	Electrolytic 47 µF 16V
C24,25	ECEA1AKK100	Electrolytic 10 µF 10V
C26	ECEA1AU221	Electrolytic 220 µF 10V
C29	ECEA1HKS010	Electrolytic 1 µF 50V
C31	YW5CH101J5VB	Ceramic 100 pF
C32	YW5X152K2VB	Ceramic 1500 pF
C33	YW5F393Z2VB	Ceramic 0.039 µF
C34	ECST1AD476ZR	Tantalum 47 µF 10V
C35	ECST1AC106ZR	Tantalum 10 µF 10V
C36	YW5X103K2VB	Ceramic 0.01 µF
C37	ECQM1H333JZ	Plastic 0.033 µF 50V
C38	ECST1AC106ZR	Tantalum 10 µF 10V
C41	ECEA0JKN470	Electrolytic 47 µF 6.3V(KN)
C42	ECST1CC106ZR	Tantalum 10 µF16V
C43	YW5F104Z2VB	Ceramic 0.1 µF
C44	YW5CH101J5VB	Ceramic 100 pF
C45	YW5F104Z2VB	Ceramic 0.1 µF
C53	ECEA1AU221	Electrolytic 220 µF 10V
C54,55	YW5X103K2VB	Ceramic 0.01 µF
L1	YW664D101K	Coil 100 µH
L2	YFNL45T221K	Coil 220 µH
L3	YWNL45391K	Coil 390 µH
L4	YFNL45T221K	Coil 220 µH
L5	YWNL322R2K	Coil 2.2 µH
L6,8	YFF3216A2R2K	Coil 2.2 µH
T1	ETE11K4AY	Flyback Transformer
CF1	YWELB4B046	Filter
J79	YF21160R00T	Jumper Resistor
CN1	YW530202410	24-pin Connector
CN2	YW530202610	26-pin Connector

REF.NO.	PART NO.	DESCRIPTION
MICROPROCESSOR BOARD		
PCB6 (NLA)	YWVKYBL60E4A	Printed Circuit Board Assy
IC1	NJM2904M	IC
IC2	YWTC4S66FR	IC
IC3	YWM5295L	IC
IC4	YWS2430IF	IC
IC5	YWCF37801PG	IC
IC6	YWD75108FJ76	LSI
IC7	YWTC4S69F	IC
IC8	YWTC4S71F	IC
IC9,10	YWTC4S66FR	IC
IC11	YWTC4S69F	IC
Q1-3	2SB1218-QRS	Transistor
R1	ERJ3GEYF103	Metal 10K ohms 1/16W
R2,3	ERJ3GEYF752	Metal 7.5K ohms 1/16W
R4	ERJ3GEYJ101	Carbon 100 ohms 1/16W
R6	ERJ3GEYJ223	Carbon 22K ohms 1/16W
R7,8	ERJ3GEYJ103	Carbon 10K ohms 1/16W
R9,10	ERJ3GEYJ472	Carbon 4.7K ohms 1/16W
R11-27	ERJ3GEYJ103	Carbon 10K ohms 1/16W
R29-33	ERJ3GEYJ102	Carbon 1K ohms 1/16W
R34-36	ERJ3GEYJ101	Carbon 100 ohms 1/16W
R37,38	ERJ3GEYJ102	Carbon 1K ohms 1/16W
R39-42	ERJ3GEYJ103	Carbon 10K ohms 1/16W
R47	ERDS2TJ105	Carbon 1M ohms
Z1	EXBM16D8DLG	Block Resistor
C2	ECEV0JV101	Electrolytic 100 µF 6.3V
C3	ECEV1CV470	Electrolytic 47 µF 16V
C4	ECEV0JV220	Electrolytic 22 µF 6.3V
C5	YW5X222K5VB	Ceramic 2200 pF
C6	ECEV0JV101	Electrolytic 100 µF 6.3V
C7	YW5X222K5VB	Ceramic 2200 pF
C8,9	ECEV1CV470	Electrolytic 47 µF 16V
C10	ECEA0JKA221	Electrolytic 220 µF 6.3V (KA)
C11	ECEV1CV470	Electrolytic 47 µF 16V
C12	ECEA0JKA221	Electrolytic 220 µF 6.3V (KA)
C13	YW5F104Z2VB	Ceramic 0.1 µF
C14,15	YW5X102K5VB	Ceramic 1000 pF
C16	ECEV0JV220	Electrolytic 22 µF 6.3V
C28,29	ECEA0JKA221	Electrolytic 220 µF 6.3V (KA)
L1	YFF3216E8R2K	Coil 8.2 µH
L2	YWNL328R2K	Coil 8.2 µH
X1	YFEF0-FC4004	Crystal Oscillator
J1	ERJ3GEY0R00	Jumper Resistor
J3	ERJ8GCS0R00	Jumper Resistor
J28	ERJ3GEY0R00	Jumper Resistor
CN1	YW530202410	24-pin Connector
CN2	YW530202610	26-pin Connector

MOTHER BOARD

REF.NO.	PART NO.	DESCRIPTION
PCB7 (NLA)	YWVKYBL60P5A	Printed Circuit Board Assy
F1	YFSSFR800	Current Fuse 0.8A 125V
CN1	YW520222410	24-pin Connector
CN2	YW520222610	26-pin Connector
CN3	YW520222410	24-pin Connector
CN4,5	YW520222610	26-pin Connector
CN6-8	YW520222410	24-pin Connector
CN9	YW520222610	26-pin Connector
CN10	YW520301210	12-pin Connector
CN11	YW520302010	20-pin Connector
CN12	EMCS0250Z	2-pin Connector
CN13	YWXK2A0441	Connector
CN14	EMCS0350Z	3-pin Connector
CN15	EMCS0450Z	4-pin Connector
M54	YFV1KA0002A4	Washer

SWITCH BOARD

REF.NO.	PART NO.	DESCRIPTION
PCB8 (NLA)	YWVKYBL60P6A	Printed Circuit BoardAssy
Q1	2SD1819-QRS	Transistor
D1,2	MA141K	Diode
D3	MA141WK	Diode
D4	MA141K	Diode
D6	MA141WK	Diode
R1	ERJ3GEYJ512	Carbon 5.1K ohms 1/16W
R2	ERJ3GEYJ472	Carbon 4.7K ohms 1/16W
R3	ERJ3GEYJ562	Carbon 5.6K ohms 1/16W
R4	ERJ3GEYJ472	Carbon 4.7K ohms 1/16W
R5,6	ERJ3GEYJ103	Carbon 10K ohms 1/16W
R7	ERJ3GEYJ750	Carbon 75 ohms 1/16W
VR1	EVML4GA00B54	Variable Resistor 50K ohms
VR2	EVML4GA00B16	Variable Resistor 1M ohms
VR3	EVML4GA00B14	Variable Resistor 10K ohms
C1	YW5F104Z2VB	Ceramic 0.1 μF
SW1-3	YWSSS222AN	Slide Switch
SW4,5	YFSSS223A	Slide Switch
SW6	YWSSS222AN	Slide Switch

REAR BOARD

REF.NO.	PART NO.	DESCRIPTION
PCB9	YWVRYBL20P7B	Printed Board
R1	ERDS2FJ101	Carbon 100 ohms 1/4W
SW1	YWSSSS912L4	Slide Switch
SW4	SSS342L4N	Slide Switch

ALC BOARD

REF.NO.	PART NO.	DESCRIPTION
PCB10	YWVRYBL20P8A	Printed Board
C1,2	YF400101CHJT	Ceramic 100 pF
C3	YF400222XKT	Ceramic 2200 pF
L1-4	YWNL32R68K	Coil

LED BOARD

REF.NO.	PART NO.	DESCRIPTION
PCB11	YWVRZD130J1B	Printed Board
D1	LN238RPH	Diode

POWER BOARD

REF.NO.	PART NO.	DESCRIPTION
	YWD4055B	Power Supply Unit for WV-BL600/A,B
	YWD4055V	Power Supply Unit for WV-BL600/G
IC1	YWMA1050	IC
IC2	YWUPC1093J	IC
D1	YWS1VB40	Rectifier
D2	YWERA1504	Diode
D3	ERB84-009	Diode
ZD1	YWRD13B3	Zener Diode
PC1,2	YWPC111-B	Photo Coupler
V1	YW450NR-07D	Varister
R1	ERDS2TJ824	Carbon 820K ohms 1/4W
R2	ERG2ANJ823	Metal 82K ohms
R3	ERDS2TJ331	Carbon 330 ohms1/4W
R4	ERDS2TJ151	Carbon 150 ohms1/4W
R5	ERG2ANJ683	Metal 68K ohms1 W
R6	ERO25CKF1502	Carbon 15K ohms1 /4W for WV-BL600/A,B
R7	ERDS2TJ271	Carbon 270 ohms1/4W

REF.NO.	PART NO.	DESCRIPTION	
R8	ER025CKF1502	Metal	15K ohms 1/4W
R9	ER025CKF4301	Metal	4.3K ohms 1/4W
R10	ERDS2TJ222	Carbon	2.2 ohms 1/4W
R11	ERDS2TJ560	Carbon	56 ohms 1/4W
R12	ERDS2TJ151	Carbon	150 ohms 1/4W
C1	B81121-CB125	Film	0.1 µF 250V
C2	UPC2G100MRH	Electrolytic	10 µF
C3	UIT2GR47MPA	Electrolytic	0.47 µF
C5	UMT1H010MCH	Electrolytic	1 µF 50V
C6	UPF1C181MPH	Electrolytic	180 µF 16V
C7	UPF1C181MPH	Electrolytic	180 µF 16V
C8	AMZ-332K50	Film	3300 pF
C9,10	DE7090B102KV	Ceramic	1000 pF 400V
C11	UVZ1C101MAH	Electrolytic	100 µF 16V
C12	PMZ285MA447	Film	4700 pF 250V
C13	YWAMZ-102K50	Film	1000 pF
C14	DE7100FZ472P	Ceramic	4700 pF
L1	YWFC-061-KT	Line Filter	
L2	YWCH0608-700	SB Coil	
F1 ⚠	XBA2C04TR0	Fuse	
E1	YFPU51212	Fuse Holder	
PT1 ⚠	YWPT-P30	Power Transformer	
CN1	EMCS0450Z	4Pin Connector	
M45	YWD40453001A	Power Unit Case	
M46	YWD40453002A	Power Unit Cover	
M47	YWD40455001B	Shield Case	

ACCESSORY PARTS/PACKAGING PARTS

CN110	YFE4191J100	ALC Connector
M61	YWV8QA1912AN	Operating Instructions
M63	YWV7SA0942A4	Caution Label for WV-BL600/B,G
M64	YWT050803	Polyethylene Bag
M65	YWT20X35C03	Polyethylene Bag
M66	YWV9CA1324AN	Packaging for WV-BL600/A
	YWV9CA1333AN	Packaging for WV-BL600/B
	YWV9CA1339AN	Packaging for WV-BL600/G
M67	YFV8FA0070A4	Packaging Label for WV-BL600/A
M68	YWV8FA0140A4	Packaging Label for WV-BL600/A

REF.NO.	PART NO.	DESCRIPTION

CCTV CAMERA WV-BL602

MISCELLANEOUS

Q101	2SB941-PQR	Transistor
SW101	YFMFS201N	Slide Switch
E101	YF40S1BYF2P	2-pin Terminal
CN101,102	YWHXC0325900	ALC Connector
CN103	YFD4151N200	Auto Iris Connector
M1	YWV5BA0060A2	Front Escutcheon
M2	YWV0EA0098AN	CCD Image Sensor Assy
M3	YWV2SA1480A2	Main Shassis
M4	YWV4JA0262A4	Spring for Bracket
M5	YWV1EA0127A4	Special Screw for FB Lock
M6	YWV1EA0128A4	Special Screw
M7	YWV3FA0101A3	FB Control Ring
M8	YWBC-2B	Body Cap
M9	YWV7DA0220A4	Heat Sink
M10	YWV2SA1314A4	Mounting Angle for Conector
M11	YWV5WH0893A4	Right Side Panel
M12	YWV5WC0884A4	Left Side Panel
M13	YWV5EA0632A2	Bottom Cover
M16	YWV2KA0491A2	Rear Chassis
M20	YWV7MA0270A4	Caution Label
M23	YWV2EA0132A3	Guide
M25	YWV5EA0749A2	Upper Cover
M26	YWV5EA0748A3	Side Cover
M27	YWV2TB0169A3	Mounting Base
M28	YWV1EA0158A4	Special Screw
M29	YWV2SA1479A4	Mounting Angle
M30	YWV4HA0128A4	Shaft
M32	YWV7SA1012A4	Label
M33	YFV7MA0099A4	UL Label
M34	YWV1KA0106A4	Washer
M35	YWV5WC0888A4	Rear Panel
M36	YFV5BA0026A3	Rear Escutcheon
M37	YWV7QA2005A4	Main Label
M38	YFV2NA0084A4	Spacer
M39	YFV2PA0207A4	Insulator
M40	YFV2NA0071A4	Spacer for Terminal

REF.NO.	PART NO.	DESCRIPTION
DRIVE BOARD		
Refer to Replacement parts list for WV-BL600		
PROCESS BOARD		
Refer to Replacement parts list for WV-BL600		
MEMORY BOARD		
Refer to Replacement parts list for WV-BL600		
INTERFACE BOARD		
Refer to Replacement parts list for WV-BL600		
MICROPROCESSOR BOARD		
Refer to Replacement parts list for WV-BL600		
MOTHER BOARD		
PCB7	YWVKYBL60J5A	Printed Circuit BoardAssy
F1	YFSSFR800	Current Fuse 0.8A 125V
CN1	YW520222410	24-pin Connector
CN2	YW520222610	26-pin Connector
CN3	YW520222410	24-pin Connector
CN4,5	YW520222610	26-pin Connector
CN6-8	YW520222410	24-pin Connector
CN9	YW520222610	26-pin Connector
CN10	YW520301210	12-pin Connector
CN11	YW520302010	20-pin Connector
CN12	EMCS0250Z	2-pin Connector
CN13	YWXK2A0441	Connector
CN14	EMCS0350Z	3-pin Connector
CN15	EMCS0250Z	2-pin Connector
M54	YFV1KA0002A4	Washer
SWITCH BOARD		
PCB8	YWVKYBL60J6A	Printed Circuit BoardAssy
Q1	2SD1819-QRS	Transistor
D1,2	MA141K	Diode
D3	MA141WK	Diode
D4	MA141K	Diode
D6	MA141WK	Diode
R1	ERJ3GEYJ512	Carbon 5.1K ohms 1/16W
R2,4	ERJ3GEYJ472	Carbon 4.7K ohms 1/16W
R5,6	ERJ3GEYJ103	Carbon 10K ohms 1/16W
R7	ERJ3GEYJ750	Carbon 75 ohms 1/16W
VR1	EVML4GA00B54	Variable Resistor 50K ohms
VR3	EVML4GA00B14	Variable Resistor 10K ohms
C1	YW5F104Z2VB	Ceramic 0.1 μF
SW2,3	YWSSS222AN	Slide Switch
SW4,5	YFSSS223A	Slide Switch
SW6	YWSSS222AN	Slide Switch
REAR BOARD		
PCB9	YWVRYBL20P6B	Printed Board
R1	ERDS2FJ101	Carbon 100 ohms 1/4W
C1	ECKF1H222KB	Ceramic 2200 pF 50V
SW1	YWSSSS912L4	Slide Switch
SW4	SSS342L4N	Slide Switch
ALC BOARD		
Refer to Replacement parts list for WV-BL600		
LED BOARD		
Refer to Replacement parts list for WV-BL600		
ACCESSORY PARTS/PACKAGING PARTS		
CN110	YFE4191J100	ALC Connector
M61	YWV8QA1912AN	Operating Instructions
M64	YWT050803	Polyethylene Bag
M65	YWT20X35C03	Polyethylene Bag
M66	YWV9CA1334AN	Packaging

REF.NO.	PART NO.	DESCRIPTION
CCTV CAMERA WV-BL604		
MISCELLANEOUS		
Q101	2SB941-PQR	Transistor
SW101	YFMFS201N	Slide Switch
E101	YW40S1BYF3P	3-pin Terminal
CN101,102	YWHXC0325900	ALC Connector
CN103	YFD4151N200	Auto Iris Connector
M1	YWV5BA0060A2	Front Escutcheon
M2	YWV0EA0097AN	CCD Image Sensor Assy
M3	YWV2SA1480A2	Main Shassis
M4	YWV4JA0262A4	Spring for Bracket
M5	YWV1EA0127A4	Special Screw for FB Lock
M6	YWV1EA0128A4	Special Screw
M7	YWV3FA0101A3	FB Control Ring
M8	YWBC-2B	Body Cap
M9	YWV7DA0220A4	Heat Sink
M10	YWV2SA1314A4	Mounting Angle for Conector
M11	YWV5WB0990A4	Right Side Panel
M12	YWV5WA0991A4	Left Side Panel
M13	YWV5EA0746A2	Bottom Cover
M14	YFV2FA0122A4	Cushion
M15	YWV2SA1478A2	Mounting Angle for Power Unit
M16	YWV2KA0491A2	Rear Chassis
M20	YWV7MA0270A4	Caution Label
M23	YWV2EA0132A3	Guide
M24	YWV2PA0343A4	Insulator
M25	YWV5EA0747A2	Upper Cover
M26	YWV5EA0748A3	Side Cover
M27	YWV2TB0169A3	Mounting Base
M28	YWV1EA0158A4	Special Screw
M29	YWV2SA1479A4	Mounting Angle
M30	YWV4HA0128A4	Shaft
M32	YWV7SA1011A4	Label
M33	YFV7MA0099A4	SUL Label
M34	YWV1KA0106A4	Washer
M35	YWV5WA0889A4	Rear Panel
M36	YFV5BA0026A3	Rear Escutcheon
M37	YWV7QA2006A4	Main Label
M38	YFV2NA0084A$	Spacer
M39	YFV2PA0207A4	Insulator
M40	YWV2NA0199A4	Spacer

REF.NO.	PART NO.	DESCRIPTION	
DRIVE BOARD			
Refer to Replacement parts list for WV-BL600			
PROCESS BOARD			
Refer to Replacement parts list for WV-BL600			
MEMORY BOARD			
Refer to Replacement parts list for WV-BL600			
INTERFACE BOARD			
Refer to Replacement parts list for WV-BL600			
MICROPROCESSOR BOARD			
Refer to Replacement parts list for WV-BL600			
MOTHER BOARD			
Refer to Replacement parts list for WV-BL600			
SWITCH BOARD			
Refer to Replacement parts list for WV-BL600			
REAR BOARD			
PCB9	YWVRYBL20P6B	Printed Board	
R1	ERDS2FJ101	Carbon	100 ohms 1/4W
C1,2	ECKF1H222KB	Ceramic	2200 pF 50V
SW1	YWSSSS912L4	Slide Switch	
SW4	SSS342L4N	Slide Switch	
ALC BOARD			
Refer to Replacement parts list for WV-BL600			
LED BOARD			
Refer to Replacement parts list for WV-BL600			

REF.NO.	PART NO.	DESCRIPTION	
POWER BOARD			
	YWD4046E	Power Supply Unit	
IC1	YWUPC1093J	IC	
Q1	2SC3568-K	Transistor	
Q2	2SD471	Transistor	
D1	YWDS2SB60	Diode	
D2	ERB44-02	Diode	
D3	1SS55	Diode	
D4	ERB84-009	Diode	
ZD1	YWRD4.3EB1	Zener Diode	
ZD2	YWRD13EB3	Zener Diode	
PC1,2	YWPS24011KY	Photo Coupler	
R1	ERDS2TJ153	Carbon	15K ohms 1/4W
R2	ERG1SJ332	Metal	3.3K ohms 1W
R3	ERDS2TJ151	Carbon	150 ohms 1/4W
R4	ERDS1TJ151	Carbon	150 ohms 1/4W
R5	ERDS2TJ821	Carbon	820 ohms 1/4W
R6	ERDS2TJ471	Carbon	470 ohms 1/4W
R7	ERG1SJ222	Metal	2.2K ohms 1W
R8	ER025CKF2700	Metal	270 ohms 1/4W
R9	ERDS2TJ681	Carbon	680 ohms 1/4W
R10	ER025CKF1502	Metal	15K ohms 1/4W
R11	ER025CKF4301	Metal	4.3K ohms 1/4W
R12	ERDS2TJ222	Carbon	2.2K ohms 1/4W
C1	YWAMZ474K50	Film	0.47 µF
C2	ECEA1HGE471	Electrolytic	470 µF 50V
C3	ECEA1HGE010	Electrolytic	1 µF 50V
C4	YWAMZ683K50	Film	0.068 µF 50V
C5	YWAMZ333K50	Film	0.033 µF 50V
C6	UET1H010MAH	Electrolytic	1 µF 50V
C7	ECEA1EFE471	Electrolytic	470 µF 25V
C8	AMZ-332K50	Film	3300 pF 50V
C9	ECEA1CGE101	Electrolytic	100 µF 16V
C10	DE7100F222MV	Ceramic	2200 pF 400V
L1	YWSU9V-07010	Line Filter	
L2	YWCH0608-700	Coil	
F1 ⚠	XBA2C20ET0A	Fuse	2A 250V
E1	YFPU51212	Fuse Holder	
PT1 ⚠	YWPT-P30	Power Transformer	
CN1	EMCS0450Z	4- pin Connector	
M45	YWD40453001A	Power Unit Case	
M46	YWD40453002A	Power Unit Cover	
M47	YWD40455001B	Power Unit Shield Case	
M48	YWD40455002A	Heat Sink	

REF.NO.	PART NO.	DESCRIPTION
ACCESSORY PARTS/PACKAGING PARTS		
CN110	YFE4191J100	ALC Connector
M61	YWV8QA1912AN	Operating Instructions
M64	YWT050803	Polyethylene Bag
M65	YWT20X35C03	Polyethylene Bag
M66	YWV9CA1335AN	Packaging